

# RAILROAD GAZETTE

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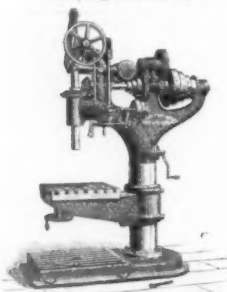
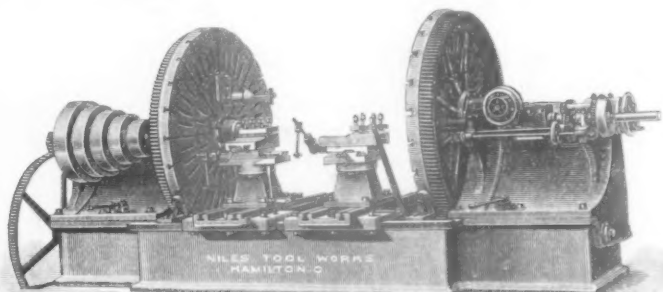
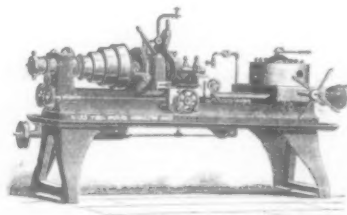
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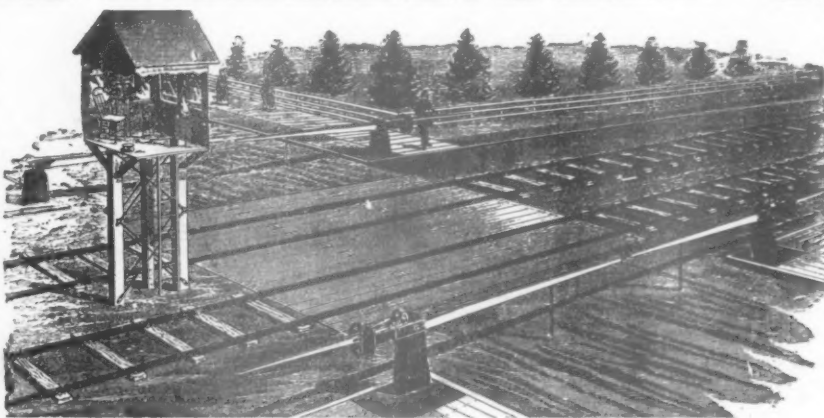
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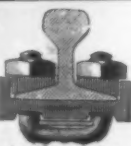
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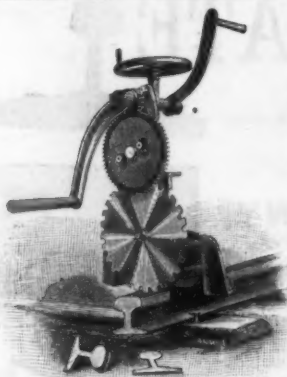
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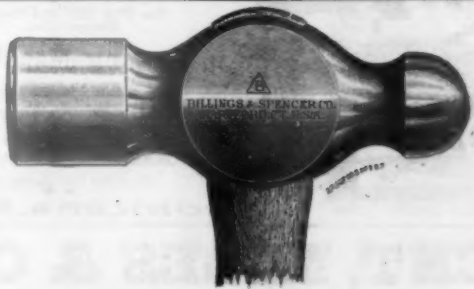
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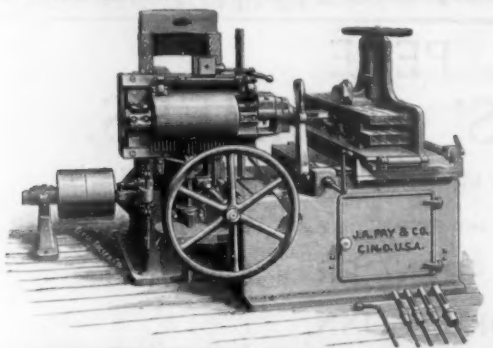
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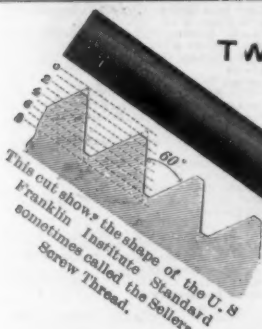
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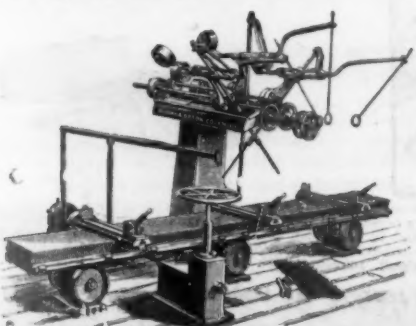
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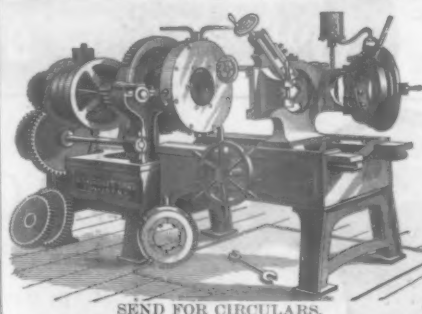
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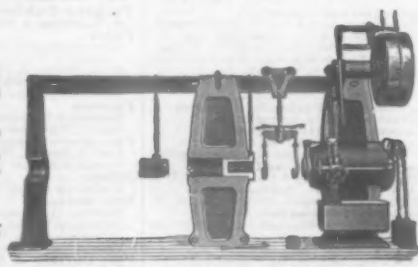
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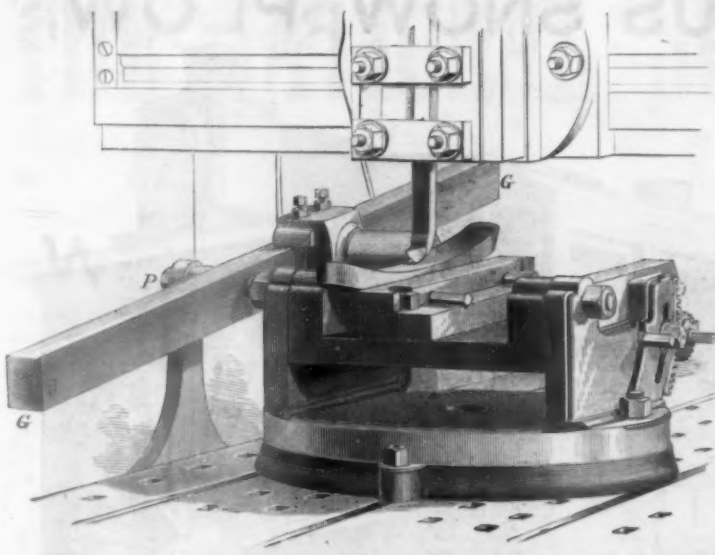
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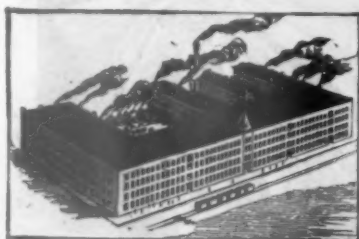


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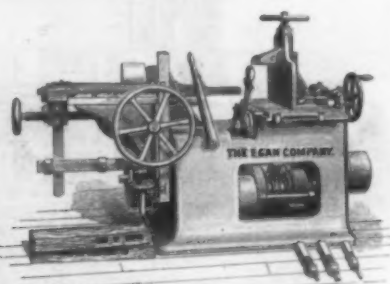


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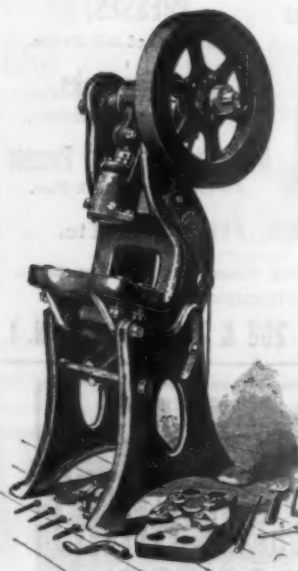


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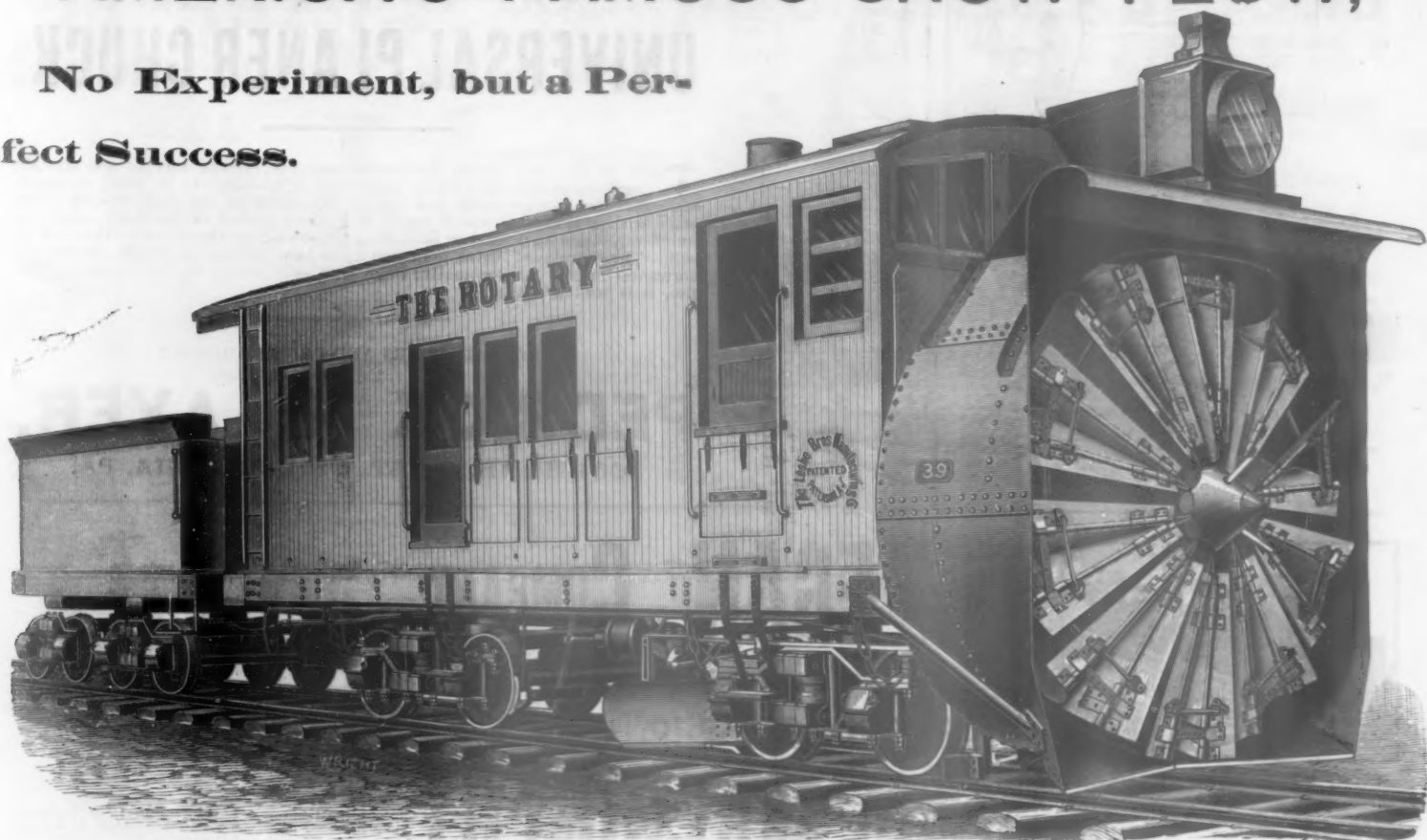
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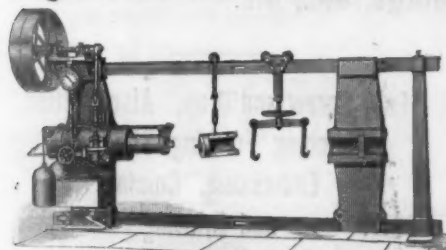
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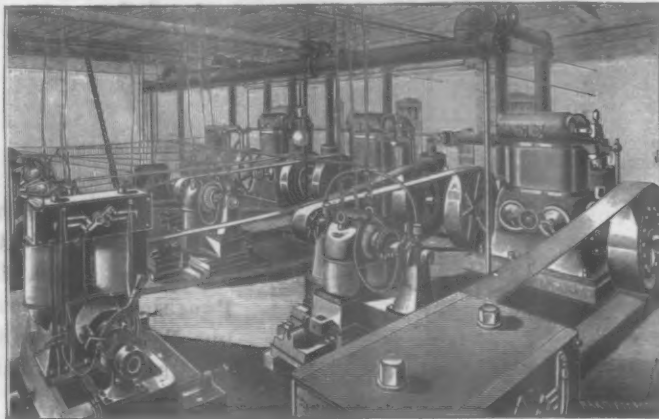
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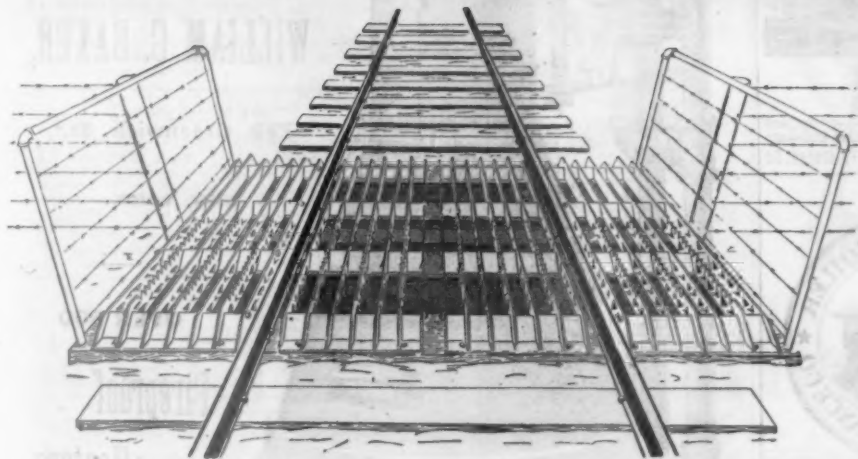
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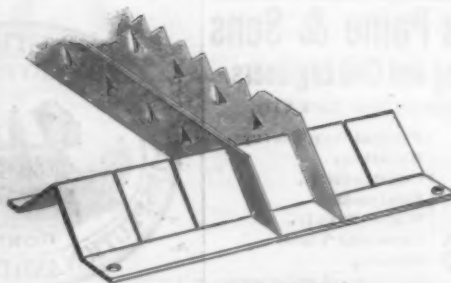
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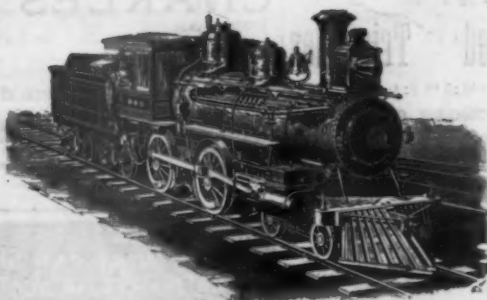
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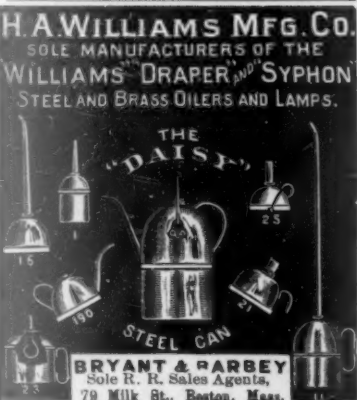
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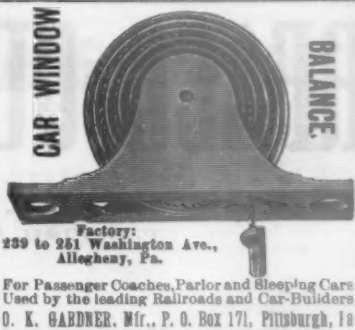
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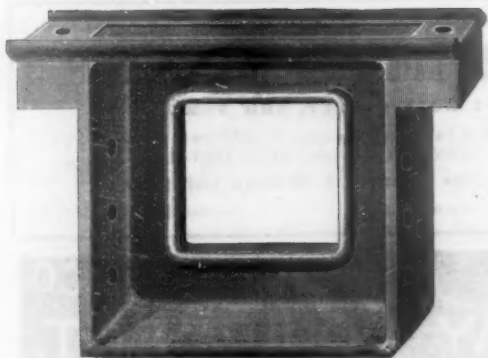
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FOR PASSENGER CARS, FREIGHT CARS AND TENDERS.

ALSO DRIVER BRAKES AND AIR EQUIPMENT FOR ENGINES.

*The Entire Brake and Signal Apparatus Is Interchangeable with the Westinghouse*

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**FOR RAILWAY SERVICE.**

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# M. C. B. COUPLERS.—COMPARISONS.

## Official Records, 10,676 Standard Couplers.

Date.	Drawheads.	Knuckles.
September, 1890, -	- 5	49
October, " -	- 8	81
November, " -	- 45	147
December, " -	- 50	131
January, 1891, -	- 22	116
February, " -	- 66	122
March, " -	- 63	172
April, " -	- 51	176
May, " -	- 13	100
June, " -	- 28	110
July, " -	- 13	72
August, " -	- 19	104
September, " -	- 21	73
October, " -	- 18	112
Total, -	- 422	1,565

### PERCENTAGE OF BREAKAGES FOR ONE YEAR.

Drawheads, -	-	-	-	3 <sup>39</sup> <sub>100</sub>
Knuckles, -	-	-	-	12 <sup>54</sup> <sub>100</sub>

### LIFE.

Drawheads, -	-	-	30 years.
Knuckles, -	-	-	8 "

## The Standard Car Coupling Co.

Will contract with any railroad company to equip 1,000 or more cars at low prices, and will agree to maintain them for

**\$650 PER THOUSAND CARS.**

## Compare the Following: 10,000 Couplers.

Date.	Drawheads.	Knuckles.
September, 1890 -	- 174	138
October, " -	- 147	311
November, " -	- 274	492
December, " -	- 283	508
January, 1891 -	- 252	382
February, " -	- 271	484
March, " -	- 249	638
April, " -	- 225	522
May, " -	- 216	560
June, " -	- 227	511
July, " -	- 231	454
August, " -	- 232	455
Total, -	- 2,781	5,455

### PERCENTAGE OF BREAKAGES FOR ONE YEAR.

Drawheads, -	-	-	-	27 <sup>81</sup> <sub>100</sub>
Knuckles, -	-	-	-	54 <sup>55</sup> <sub>100</sub>

### LIFE.

Drawheads, -	-	3 yrs. 6 mos.
Knuckles, -	-	1 " 9 "

Should seventy-five per cent. of above breakages be replaced without charge, and twenty-five per cent. at, say **\$9.20** each for drawheads, and **\$2.80** for knuckles, the cost of maintenance would be about **\$2.04** per car per annum, and would cost, exclusive of locks, etc.

**\$2,040 PER THOUSAND CARS.**

The Standard Co. is also prepared to contract with Railways and Railway Systems, for a part of their equipment, at low prices, and guarantee to replace ALL breakages (including locks) of the Standard Coupler (WITHOUT CHARGE) FOR ONE YEAR OR LONGER, and to furnish security for the fulfillment of contracts.

## THE STANDARD CAR COUPLING CO.,

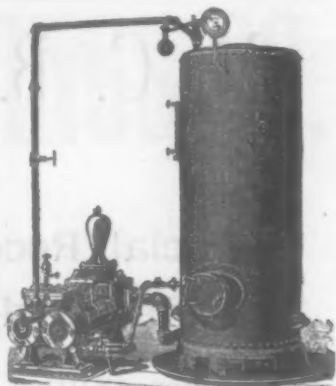
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Plants completely installed or materials and plans furnished.



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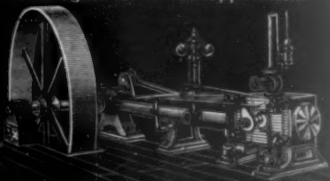
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A SPECIALTY.

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**Automatic Highway Crossing Alarm**

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A Treatise on the Conduct of Freight Accounts at Stations, and the legal requirements that must be observed at such places in handling freight. A manual.

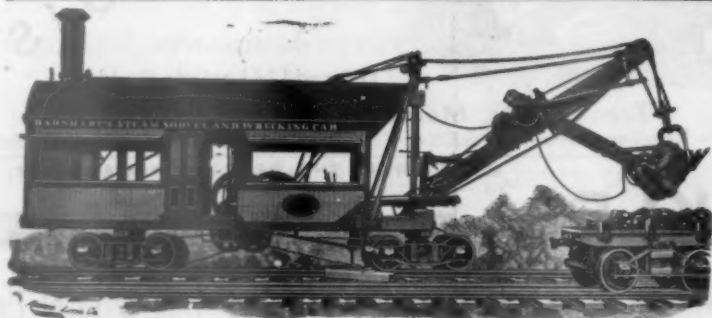
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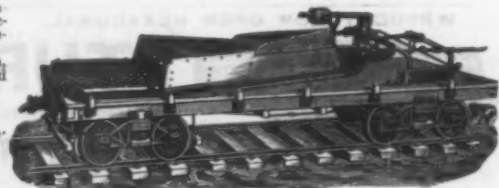
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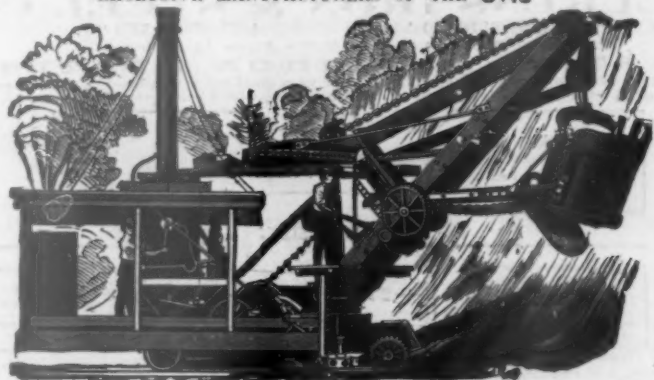
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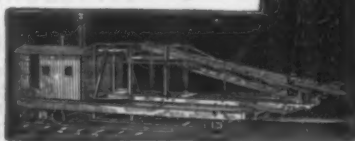
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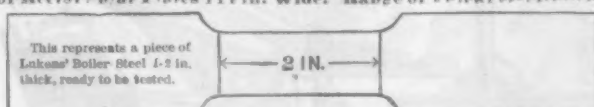
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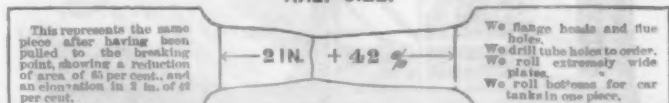
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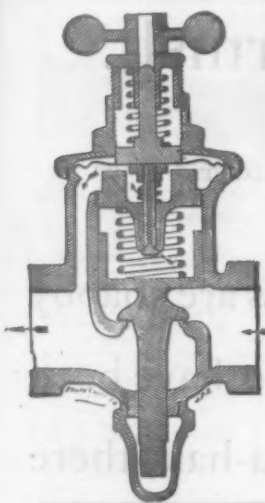
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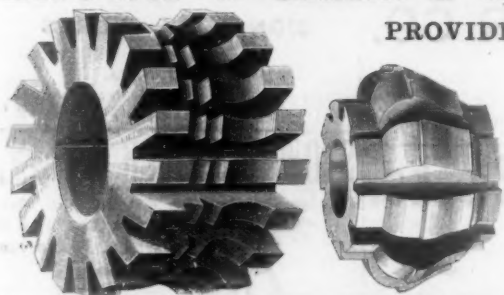
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FRIDAY, FEB. 12.

## CONTENTS.

ILLUSTRATIONS:	PAGE.	GENERAL NEWS:	PAGE.
Westinghouse Freight Brake Gear for 30-ton Hopper Coal Cars.....	115	Locomotive Building.....	129
Experimental Track on the Delaware & Hudson Canal Co.'s Lines.....	116	Car Building.....	126
Ireland Journal Box Ltd., Vauclain Compound for Fast Passenger Service.....	117	Bridge Building.....	126
Dyn mo and Engine Room— Northern Pacific Shops at Edi on, Wash.....	118	Meetings and Announce- ments.....	127
Electric Transfer Table at Edison Sh ops.....	118	Personal.....	128
A Job of Relocation.....	119	Elections and Appointments Railroad Construction.....	129
Platt Milling Machine.....	119	General Railroad News.....	130
Mundy's New 8 "pool Con- tractors' Engine.....	120	Traffic.....	130
Comparative Illuminating Power of Pintech Gas.....	121		
CONTRIBUTIONS:		MISCELLANEOUS:	
Super-elevation on Curved Bridges.....	118	Technical.....	121-124
Coupled Engines of Single Locomotive Economy.....	118	The Scrap Heap.....	125
EDITORIALS:		Railroad Law.....	126
The Results of the Recent Brake Tests at Burlington.....	122	Trials of Westinghouse and New York Air Brakes.....	127
Some American and English Railroad Statistics.....	123	Annual Report of the Rail- road Commissioner of Ohio.....	114
EDITORIAL NOTES.....	123-124	Car Roofs.....	115
NEW PUBLICATIONS.....	124	Master Car Builders' Stand- ards.....	116
		The Life of E li and Ties in France.....	117
		St. Cloud Car Shops—Great Northern Railroad.....	117
		American Railroad Statistics as Seen by a Scotchman.....	118
		Railroad Location—Notes in the Field.....	119
		Bridges at New York.....	120

## Contributions.

## Super-Elevation on Curved Bridges.

Norfolk & Western Railroad Co.,  
ROANOKE, Va., Feb. 8, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I see in the *Railroad Gazette* of Jan. 29 a letter by Eli Mewal, under the head of "Track on Curved Bridges," in which he says, "there is not yet a rational method for obtaining the elevation for track on curved bridges." J. C. Rawn, Esq., Engineer of Construction on the Clinch Valley Extension of the Norfolk & Western, recognizing the inconvenience of keeping a supply of emergency wedge ties on hand to suit the different degrees of curvature, conceived the idea of building the elevation in the girder, and carried it into practical effect in the deck plate-girder bridge at First Guest River crossing about one year ago, and it has proved perfectly satisfactory.

H. E. GETTYS,  
Bridge Inspector, N. & W.

## Coupled Engines or Single?

LONDON, Jan. 28, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am pleased to see that this subject is again attracting the attention of the readers of the *Railroad Gazette*, and it is curious to note some of the remarks made. In the face of the fact that the best heavy train record either in England or America has been before the eyes of "Chicago" in a recent number of the *Gazette*, and this was by a North Eastern single of Mr. Worsdell's, "Chicago" gives vent to a wall about enforced absence of various cars from trains pulled by single engines. But he is quite off the track when he imagines that heavy English trains weigh less than heavy American trains. They do not, and yet they are pulled by either single or compound engines as it may happen. To show how little "Chicago" has studied the question before he rushed to condemn single engines I inclose a few pages from a recent "Bradshaw," from which you may see in the trains of the Midland and Great Northern roads the schedule time of any train throughout the day and the mileage distance, while you will note several trains are sleepers and several also carry dining and luncheon cars. Now on both these English lines any one of these trains is as likely to be hauled by a single as by a coupled engine, and that too at such a pace as would bring Chicago and New York within 18 hours. I think these pages from "Bradshaw," which is not a comic paper, are quite sufficient to demolish "Chicago's" argument.

As a fact, does he not enter the list entirely unprovided with any facts to prove his argument? Has an engine of modern build with one pair of drivers ever been tried in America? Arguments against it are as valueless, in the face of the daily work in England, and of the recent North Eastern heavy weight run as were those of the original opponents of railroads.

An argument is advanced against singles that they start slowly. This is fallacious and based on wrong conclusions. The large wheels of English single engines may start slowly, but it is because they are large, not because they are single. If only made 6 ft. in diameter they would start fast enough, and have adhesion enough with sand blast, and, at speed, enough without. But granting slow starting, of what special account is this in an engine running 100 miles between stops? No one is advocating large wheel singles on way trains, but on expresses stopping but seldom. If "Chicago" or any

other believer in small wheels will go to the trouble of calculating a 5 ft. and an 8 ft. wheel in regard to counterbalancing at 60 or 70 miles an hour, he will perhaps begin to see that an English large wheeler has a better adhesion all round than a 5 ft. engine coupled. It is much more uniform. We all know how faulty is the adhesion of small wheels at high speeds.

If single-wheel engines will not pull American trains the fault will not be in the engines, but will be found either in the track or in the heavy traction of the cars, which two items underlie the query advanced by one of your London contemporaries, "Why do Americans use such enormous engines to haul loads which are taken in England at equal speeds by much smaller engines." I might add to this: Why do American locomotives indicate such enormous horse power for duty which our English locomotive would do for about two thirds the horse power?

In spite of my advocacy of single engines, based on a knowledge of both kinds involved in the discussion, I do believe that the fault lies with the American engines. If it exists, as it seems to, the fault is in the track and in the car trucks and it is because of this that I believe the writers who condemn single engines without reason are either car builders or permanent way men.

As regards coupling rods the argument from heating is valueless. The loss of power does not go into journal friction, but into differential slip at the rail, and the rod ends do not heat simply because they have bearing surface enough on the pins to communicate the power which goes to rail friction. Seeing that the ends are calculated to pass at least half the power developed in the cylinders, they cannot well be expected to become hot when the total energy in the locomotive only comes from the cylinders. The rods simply act as a means of transmission of energy to the grinding of rail surface instead of the tension on draw bar. The rod does not know what it is doing and how then can it get hot when no more steam power is exerted through it? The fallacy in this argument is certainly with "Chicago," who may make his mind quite easy should he require to come to England, for he can either dine or go to bed behind a single engine if he should need to take a long journey of either say two-thirds 900 miles or only 200.

W. H. B.

## Locomotive Economy.

BUFFALO, N. Y., Dec. 1, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Nov. 10 Mr. W. F. Johnstone takes exceptions to my criticism of the report of tests on the Mexican Central, which appeared in your paper of May 22, 1891.

After carefully reading his letter and again examining the report, I am still of the opinion that we need more exact information in regard to just what the compound engines are doing. He explains the difference in the factor used for reducing the train and load to "work units" by saying that a car was dropped from the trains hauled by the ordinary engine. If this had appeared in his report of the trial the report would have been more clear. I had noticed that the factor 3.26 was used on the days mentioned in his letter, but as I was considering the different tests as a whole, I found the average factor used was 3.18, as stated. Had the dropping of the car been mentioned, it would have shown that my second table was unfair.

In working tests for comparing the relative merits of different locomotives, it is, of course, very difficult to get trains which are exactly equal, either in weight or kind of cars, and often one train draws harder than another from causes which do not appear, such as faulty lubrication, brakes binding, etc. The only fair way is to record the work done by a properly constructed dynamometer, then the differences in the hauling of the trains from any causes will not matter for the work done is exactly shown.

In the table showing the work performed by the different classes of locomotives upon the Mexican Central, Mr. Johnstone gives the total expenses of each engine. It would have been better if he had confined the tables to the fuel and water expenses, or shown them in separate tables, as it renders it necessary to eliminate the other expenses before we can get to the true saving of the compound over the other, unless there are no other savings or expenses incidental to compounding, and even in that case they should have appeared.

If there are other savings or expenses in consequence of compounding we should know what they are, as they might become a considerable factor in deciding whether to adapt that class of engines to different service. Upon roads where the fuel costs five times what it does in the northern part of the United States, or rather in the States north of the Ohio and east of the Mississippi, an economy which would justify changing our engines to compounds might not do so when the cost of fuel is about one third of the total locomotive expense.

While there can be no doubt that the compounding of locomotives should save fuel, there may be some objections to them. They have more parts and consequently must be more expensive in first cost. The extra number of parts also entail additional expense for repairs, and then it must be proved that they are as efficient under all circumstances as the ordinary locomotives.

Your issue of Oct. 2, showing tests of the Vauclain

compound upon the W. N. Y. & P. R. R., is also very interesting, and the results reported are more surprising than those we have been considering. It is unfortunate that the records of the north and south trips were not kept separate so that each trip could have been analyzed by itself; and it is also unfortunate that the same steam pressure was not used upon both engines. Certainly the standard engine would have shown better results if worked with shorter cut-off, and I notice that there is also a great difference in the water evaporated per lb. of coal between the two locomotives. This may be accounted for to some extent, as explained by Mr. Johnstone, "by the more powerful draft;" but why should the exhaust nozzles be only 3% in. on the standard, while upon the compound they are 3½ in.? The tables for data of indicator cards show that the pressure at release was more than double in the standard than in the compound, while the coal burned per sq. ft. of grate surface was 43 per cent. more. Would not the results have been different if the nozzles had been larger and the engine been worked with the same steam pressure?

The reports of this test show that there is a very large economy in fuel with the compound over the standard locomotive for general freight work; but I am inclined to think that the standard was not at its best, and that with greater steam pressure so as to cut off quicker, a much softened exhaust, with care in closing the dampers when the engine is working very hard, the results would have been more favorable to the standard than they are. The lessons we should learn is to do the best with the single expansion locomotives, getting the best results from them that can be obtained while we are proving the superiority of the compounds.

I consider it necessary in order to get a perfect report of a test of this kind to have a testing instrument to record the tractive force exerted at all times. An instrument of this kind should not cost more than \$500, as it can be applied to any ordinary caboose car, and can be arranged to record automatically the tractive force used on the train, the force and direction of the air pressure, the lengths of stops, the grades, the curves—in fact, give all the necessary data to prove just what the locomotives have done.

Enough has been shown to prove that there is great economy in the compound over the standard engines, but we need more thorough tests and longer service to show what that economy is and whether the saving in fuel fully compensates for the extra cost for repairs, oil and other expenses.

F. M. WILDER.

## Trials of Westinghouse and New York Air Brakes.

What follows is the official record of trials of the Westinghouse Air Brake and the New York Air Brake at Burlington, Ia., Feb. 3, 4 and 5, 1892.

The Westinghouse Air Brake Co. was represented by Messrs. H. H. Westinghouse, Welch, Parke, Close, Kilder and assistants. The New York Air Brake Co. was represented by Messrs. Vilas, Massey, Isbester, Turner, Woodland and assistants. The Chicago, Burlington & Quincy was represented by Messrs. Rhodes, Forsyth, Quereau, West, Foster, Torrey, Jones and Cota. The Chicago, Milwaukee & St. Paul was represented by Messrs. Gibbs, Herr and Kershaw. Messrs. Elder, Todd and Stannestad were present by invitation to represent the Pennsylvania, the Pittsburgh, Fort Wayne & Chicago and the Chicago & Northwestern railroads respectively. There were also present Mr. F. W. Sargent, Mechanical Engineer of the Congdon Brake Shoe Co., as chief assistant to Mr. William Forsyth and Mr. C. H. Quereau in the management of the dynamometer car and apparatus, and Messrs. Street, Crossman and Barnes, of the technical press, representing the *Railway Review*, *Railway Age* and the *Railroad Gazette* respectively. The entire tests were under the direct supervision of Mr. Godfrey W. Rhodes, Superintendent of Motive Power C. B. & Q. The plan of the test was laid out by Mr. Rhodes, Mr. Cota, Air-Brake Instructor of the C. B. & Q., handled the engineer's valve on the locomotive, and Mr. D. L. Barnes, of the *Railroad Gazette*, kept the official records. Most of the data was taken by two or more persons to prevent all possibility of error.

The tests were made with the following brakes:

No. 2 triple valve, New York Air Brake Co., on Westinghouse cylinders and reservoirs.

New Westinghouse triple valve, with No. 13 Brown & Sharpe wire gauge, brass graduation springs.

New Westinghouse triple, with No. 10 Brown & Sharpe wire gauge, brass graduation springs taken from valves that had been in use on palace stock cars for about two years.

Old Westinghouse triples, with No. 10 Brown & Sharpe wire gauge, brass graduation springs taken from palace stock cars that had been in use about two years.

The triples were tested just as they were taken from service and without cleaning or repairs. The cars were 34-ft. palace, stock cars, which were overhauled about two years ago and were fitted with Janney couplers, metal brake beams and quick-acting Westinghouse air brakes. The tests were made on the track on which the brake trials were made at Burlington in 1886 and 1887. Following is a description of stops Nos. 1, 2, 3 and 4, mentioned in the following tabulation:

Stops Nos. 1 and 2 are on a level between Middletown and Burlington, running toward Burlington.

No. 10 and No. 13 Brown & Sharpe gauge correspond to No. 12 and No. 15 Birmingham wire gauge.

Stops Nos. 3 and 4 are on a 53-ft. down grade between West Burlington and Burlington, running toward Burlington.

Shocks when marked *plus*, indicate a movement of the slidometer toward the locomotive, and when marked *minus*, indicate a movement backward or toward the rear of the train.

The driver brakes and tender brakes did not bear well; they were new brakes and had not become fitted to the wheel. The average slack between cars, including spring slack, was about 10 in. The brake power on these cars is about 70 per cent. of the light weight. The piston travel varied from 6 to 9 in. and averaged 7½ in.

#### NO. 1 TESTS—DETAILS OF EMERGENCY TESTS.

New York brake.					Westinghouse, light spring.				
Feb. 3, 1892.					Feb. 4, 1892.				
No. of stop.....	1	2	3	4	1	2	3	4	
Number of cars..	50	50	49	49	50	49	49	49	
Weather.....	Clear and dry.				Cloudy and light rain.				
Condition of rail.	Good.				Bad.				
Train pressure...	70	72	70	70	70	70	72	70	
Speed, miles per hour.....	15	30	31	18	36	23	30	19	36
Shock in rear car.....	+7.9	+5.1	+3.4	+7.6	0	0	+2	+1	+1
Shock in front car.....	Slidometer not used.				+2.3 +7.6 +8 +1.3				
Time of shock from movement of engineer's valve.....	6	5	5.5	5	6	6.6	6.6	5.4	7
Cylinder pressure at shock in rear car.....	60	55	58	55	58	56	57	58	58
Distance run in making stop....	297	300	156	574	239.3	384.5	162	646	
Time of stop.....	8	11.5	14.5	10.5	18.2	12	13	11	20.5
Standing test to determine the quickness of application.....	Applied in 3 sec. 50 lbs. in 4 sec.				Applied in 3 sec. 58 lbs. in 4 sec.				

#### Remarks:

New York brake.					Westinghouse, light spring.				
Feb. 3, 1892.					Feb. 4, 1892.				
Stop No. 1, no damage.					Stop No. 1, no damage.				
Stop No. 2, broke in two 22d car from front; broken draft spring.					Stop No. 2, broke in two 7th car from rear; tail strap rivets sheared.				
Stop No. 3, no damage.					Stop No. 3, no damage.				
Stop No. 4, broke in two between engine and dynamometer car; broken link.					Stop No. 4, no damage.				

Westinghouse, heavy spring.					Westinghouse, old triples, heavy spring.				
Feb. 4, 1892.					Feb. 5, 1892.				
No. of stop.....	1	2	3	4	1	2	3	4	
Number of cars..	50	50	49	49	50	50	49	49	
Weather.....	Heavy fall of wet snow.				Clear and dry.				
Condition of rail.	14 in. of snow on rail.				Good.				
Train pressure...	72	71	68	68	68	67	69	69	
Speed, miles per hour.....	23	32	22.5	33.5	24.5	31	21		
Shock in rear car.....	+5 +8 +2 -2				.3 .3 .4				
Shock in front car.....	+1.3 +2.5 +2.2 +3				+1.3 +1.6 +.5				
Time of shock from movement of engineer's valve.....	6	6	6	6	6	6.6	6		
Cylinder pressure at shock in rear car.....	60	60	57	55	55	55	55		
Distance run in making stop....	232.5	396.5	238.5	561.	283.5	417	190		
Time of stop.....	11	11	12	19	13	16.5	11.6		
Standing test to determine the quickness of application.....	Applied in 3 sec. 59 lbs. in 4 sec.				Applied in 3 sec. Train pressure was only 68 lbs.				

#### Remarks:

Westinghouse, heavy spring.					Westinghouse, old triples, heavy spring.				
Feb. 4, 1892.					Feb. 5, 1892.				
No. 1 stop, no damage.					No. 1 stop, broke in two 20th car from front. Knuckle broke at tail near lock pin.				
No. 2 stop, no damage.					Stop No. 2 broke in two 14th car from front. Drawbar pulled out.				
No. 3 stop, broke in two 15th car from front. Heavy surge broke knuckle through pivot pin hole.					Stop No. 3, no damage.				
No. 4 stop, no damage. Reaction in rear car moved slidometer a little. It occurred 16½ seconds from time of movement of engineer's valve.					Stop No. 4 was not made owing to obstruction of track by freight train.				

**Graduation Tests, No. 2.**—To determine the graduation efficiency of the brakes, 26 cars were used, standing still. Gauges were attached to the train pipe and auxiliary reservoir of the dynamometer car, middle car, and 25th car. A reduction of train pipe pressure was made on the engine at one minute intervals, the handle of engineer's valve being returned to lap after each application. The results are given below.

**Release Tests, No. 3.**—Twenty-five of the cars mentioned in the foregoing were used in these tests, standing still. Seventy pounds train pipe pressure was first obtained; the engineer's valve was then placed at lap and 100 lbs. allowed to accumulate in the main air reservoir. Full emergency application was then made without letting all the air out of the train pipe. The handle was next placed at lap after an intermission of 15 to 30 seconds to insure an equalization of pressure between auxiliary reservoirs and cylinders; a signal was given from the engine whistle, and at the same moment the handle of the engineer's brake valve was placed in running position. Observers were placed at intervals throughout the length of the train who kept record of the time it took to release the brakes from the signal. The results appear below.

#### NO. 2.—GRADUATION TEST.

Westinghouse, new triples, old springs: Pressure on engine gauge, 60 lbs.; reductions 7½ lbs., 6½ lbs., 4½ lbs., 4 lbs.

Dynamometer car.		12th car.		25th car.	
Train pipe.	Cyl.	Train pipe.	Cyl.	Train pipe.	Cyl.
72	0	67	0	68	0
65	22	58	8	62	7
58	45	52	30	56½	31
54	52	47	47	50½	44
48	47				

#### NO. 2.—GRADUATION TEST.

New York brake: Pressure on engine gauge, 60 lbs.; reductions, 6½ lbs., 6½ lbs., 6 lbs., 5 lbs.

Dynamometer car.		12th car.		25th car.	
Train pipe.	Cyl.	Train pipe.	Cyl.	Train pipe.	Cyl.
70	0	67	0	68	0
65	24	58	8	62	14
58	41	55	22	56	32
49	49	49	36	47½	47½
		43	43		

In the 25th car the gauge on the cylinder rose continually from first application to equalization. In the middle car the gauge on the cylinder rose almost continuously until 3½ lbs., then paused until next reduction. In the dynamometer car the gauge rose after first application continuously and slowly.

#### TESTS 2 AND 3.—WESTINGHOUSE AIR BRAKE—NEW VALVES AND HEAVY SPRINGS.

Time of release, seconds.		Graduation; O. K. means that brake applied.	
Car No.	Time of release, seconds.	Car No.	Time of release, seconds.
Dyn. car, off.	O. K.	Dyn. car, off.	O. K.
15,773.....	O. K.	15,773.....	O. K.
1,636.....at	O. K.	1,636.....at	O. K.
7,530.....	O. K.	7,530.....	O. K.
8,054.....	Did not apply.	8,054.....	Did not apply.
7,670.....50	Cut out—dead lever broken.	7,670.....50	Cut out—dead lever broken.
7,886.....off	Came on and blew off at every application.	7,886.....off	Came on and blew off at every application.
15,518.....	O. K.	15,518.....	O. K.
8,538.....at	O. K.	8,538.....at	O. K.
7,722.....	O. K.	7,722.....	O. K.
4,954.....35	O. K.	4,954.....35	O. K.
7,544.....off	O. K.	7,544.....off	O. K.
1,656.....	O. K.	1,656.....	O. K.
3,584.....at	O. K.	3,584.....at	O. K.
15,643.....	O. K.	15,643.....	O. K.
1,663.....	O. K.	1,663.....	O. K.
8,286.....30	O. K.	8,286.....30	O. K.
7,712.....13	O. K.	7,712.....13	O. K.
15,988.....26	O. K.	15,988.....26	O. K.
383.....22	1st.	383.....22	1st.
15,359.....61	O. K.	15,359.....61	O. K.
8,336.....37	1st and 2d application blew off—3d O. K.	8,336.....37	1st and 2d application blew off—3d O. K.
1,672.....23	O. K.	1,672.....23	O. K.
8,082.....23	O. K.	8,082.....23	O. K.
8,160.....23	O. K.	8,160.....23	O. K.

#### TESTS 2 AND 3.—NEW YORK AIR BRAKE.

Time of release, seconds.		[Graduation; O. K. means that brake applied.]	
Car No.	Time of release, seconds.	Car No.	Time of release, seconds.
Dyn. car, stuck.....	O. K.	Dyn. car, stuck.....	O. K.
7,952.....Stuck	O. K.	7,952.....Stuck	O. K.
305.....Stuck	O. K.	305.....Stuck	O. K.
8,014.....Stuck	O. K.	8,014.....Stuck	O. K.
1,629.....Stuck	O. K.	1,629.....Stuck	O. K.
7,986.....Stuck	O. K.	7,986.....Stuck	O. K.
1,639.....Stuck	O. K.	1,639.....Stuck	O. K.
8,090.....25	Did not apply: leak in leather packing.	8,090.....25	Did not apply: leak in leather packing.
8,068.....Stuck	O. K.	8,068.....Stuck	O. K.
15,967.....30	O. K.	15,967.....30	O. K.
15,659.....	This car cut out.	15,659.....	This car cut out.
15,722.....Stuck	1st and 2d did not apply—3d grad.	15,722.....Stuck	1st and 2d did not apply—3d grad.
15,684.....50	O. K. (Gauges on this car).	15,684.....50	O. K. (Gauges on this car).
8,077.....Stuck	O. K.	8,077.....Stuck	O. K.
15,799.....Stuck	O. K.	15,799.....Stuck	O. K.
15,618.....Stuck	O. K.	15,618.....Stuck	O. K.
15,958.....Stuck	O. K.	15,958.....Stuck	O. K.
8,090.....Stuck	O. K.	8,090.....Stuck	O. K.
8,162.....57	O. K.	8,162.....57	O. K.
8,330.....Stuck 2d	O. K. 1st application blew off.	8,330.....Stuck 2d	O. K. 1st application blew off.
8,136.....90	O. K.	8,136.....90	O. K.
7,882.....Stuck	1st and 2d application blew off—3d O. K.	7,882.....Stuck	1st and 2d application blew off—3d O. K.
381.....34	O. K.	381.....34	O. K.
7,844.....Stuck	O. K.	7,844.....Stuck	O. K.
9,160.....60	O. K. (Gauges on this car).	9,160.....60	O. K. (Gauges on this car).

#### TEST 3.—WESTINGHOUSE AIR BRAKE, OLD TRIPLE VALVES

Car No.	Time of release.	Car No.	Time of release.
Dyn. car.	30	8,384	30
15,773	20	15,648	45
1,636	25	8,228	30
7,530	32	7,712	20
8,054	30	15,188	40
7,470	30	305	55
7,806	10	15,959	38
15,538	15	8,336	45
8,338	32	1,672	45
7,722	70	8,062	60
4,914	35	7,952	60
7,544	75	305	24
1,656	50	8,014	20

\* Went off slowly; retaining valve probably stuck up.

**No. 4. Single Car Test.**—This test was to determine if the emergency brake would go on in service application with one car. It was carried out in the same manner as test No. 2.

**No. 5. Single Car Test.**—This was to determine if the emergency would go on one car with the engineer's valve placed in the service application position releasing all the air from the train pipe.

#### NO. 4 TEST.—SINGLE CAR.

Westinghouse, new triples, old springs; reductions, 10 lbs., 5 lbs., 4 lbs.		New York brake; reductions, 10 lbs., 5 lbs., 4 lbs.	
Train pipe.	Cylinders.	Train pipe.	Cylinders.
70.....	0	70.....	0
60.....	33	60.....	32-35
57.....	44	57.....	45
50.....	50	50.....	50

#### NO. 5 TEST.—SINGLE CAR.

Westinghouse; new triple, old spring. Reduced all air out through full service port. Dynamometer cylinder gauges moved up rapidly and then emergency went on.

NOTE.—With six cars cut in cylinder gauge moved up rapidly. No emergency.

#### A Webb Compound.

The compound locomotive, "Great Britain," built on the Webb principle, a description of which was given in the *Railroad Gazette* of Nov. 27, 1891, has now been in service since the last of November with good success. This engine is attracting considerable attention owing to the peculiarities of designs of the boilers and cylinders.

#### Foundation Brake Gear for Hopper Coal Cars—Chesapeake & Ohio Railway.

Brake rigging for hopper coal cars is difficult to design. There is not room under the car for reservoirs, hence they have to be put under the ends of the hopper over the trucks, as in the accompanying design, which has been arranged by Mr. William Garstang, Superintendent of Motive Power of the Chesapeake & Ohio, for 30-ton hopper coal cars. The plan and elevation, figs. 1 and 2, and the details, fig. 3, show how the different parts are arranged and put together.

These cars were built to be used between the coal mines and tidewater, and have made as much as 2,900 miles per month. Thirty tons of coal can be discharged from this type of car into the coal vessels in one minute. There are 800 or 900 of these cars in use with air brakes, and after 20 months' service the officers of the road report favorably on the use of air brakes for this service. This report accords exactly with the results obtained in the ore trade between Chicago and the Northwest, where there are a large number of ore cars running in solid trains with vertical plane couplers and air brakes.

This car is divided into quarters, and each quarter can be dumped separately. Probably the Chesapeake & Ohio Railway was the first to equip double-hopper cars with the air brake. At first the standard freight brake equipment was tried, but it was found to be impossible, and the auxiliary reservoir and brake cylinder were used independently, instead of in one piece, as with the standard freight equipment. In this arrangement the brake apparatus is placed on top of the sills, and entirely clear of the trucks in case of accident. In the few accidents that have occurred the brake rigging has been scarcely damaged at all, when the trucks were badly wrecked. An observer, who has ridden over the division between Hinton and Clifton Forge on a train of 31 of these cars, on which the air brakes were all operated, states that the train was controlled as softly as a passenger train, and was entirely free from shocks.

In putting up this rigging the following directions are given:

First. The relative angle of levers shown must be maintained when applying brake rigging to car timbers.

Second. Pipes to be bent when practicable and blown out with steam after bending.

Third. All connections to be perfectly tight and tested under pressure with soap suds.

Fourth. All pipes to be securely fastened to car timbers to prevent shaking and unscrewing of joints.

Fifth. Use red lead sparingly at joints, and put only on outside of pipe that screws into fitting. Never use it on inside of fittings as it is apt to get into triple valve, and interfere with the proper working of the brake.

These instructions are deserving of attention as they must be followed by everyone who expects to get reasonable good efficiency out of brake gear. Some of the worst troubles that have occurred in the introduction of air brakes for the first time have been the result of neglect of precautions such as are required in the foregoing directions. In one case 60 cars, comparatively new, all equipped with air brakes, were collected in one train. The condition of the brakes was found to be such that the pumps could not raise the pressure to 70 pounds; the leakage was greater than the delivery of the pump. Also a large percentage of the triples were not operative, and the result of an attempt to make an emergency stop was a very severe shock at the rear end due to the failure of a large portion of the triples to work efficiently. Upon examination it was found that such precautions as those demanded by the C. & O. were not taken; the brake pipes had never been blown out, and red lead had been used on the inside of the fittings and had caked on the strainers. As soon as the brake apparatus of the whole train was cleaned up and the sand removed, there was no difficulty in raising the pressure or in making a stop. It is not reasonable to expect that a triple valve will operate when it is fed with sand and red lead.

#### Annual Report of the Railroad Commissioner of Ohio.

We have received advance sheets of the annual report of Mr. J. A. Norton, Railroad Commissioner of the State of Ohio. The first page is given up to a portrait 4 in. x 5½ in. of the Commissioner. The two succeeding pages contain 10 portraits of the commissioners who have preceded him. The Commissioner says that he gives these portraits "confident that they will be appreciated, even as a matter of history." He does not say why the portrait of the present incumbent is on so much larger scale than those of the ex-commissioners, but undoubtedly he is the handsomest man of the eleven.

The first topic treated is that of powers of the Commissioner. It is said that the efficiency of the department is hindered by the



Fig. 2.

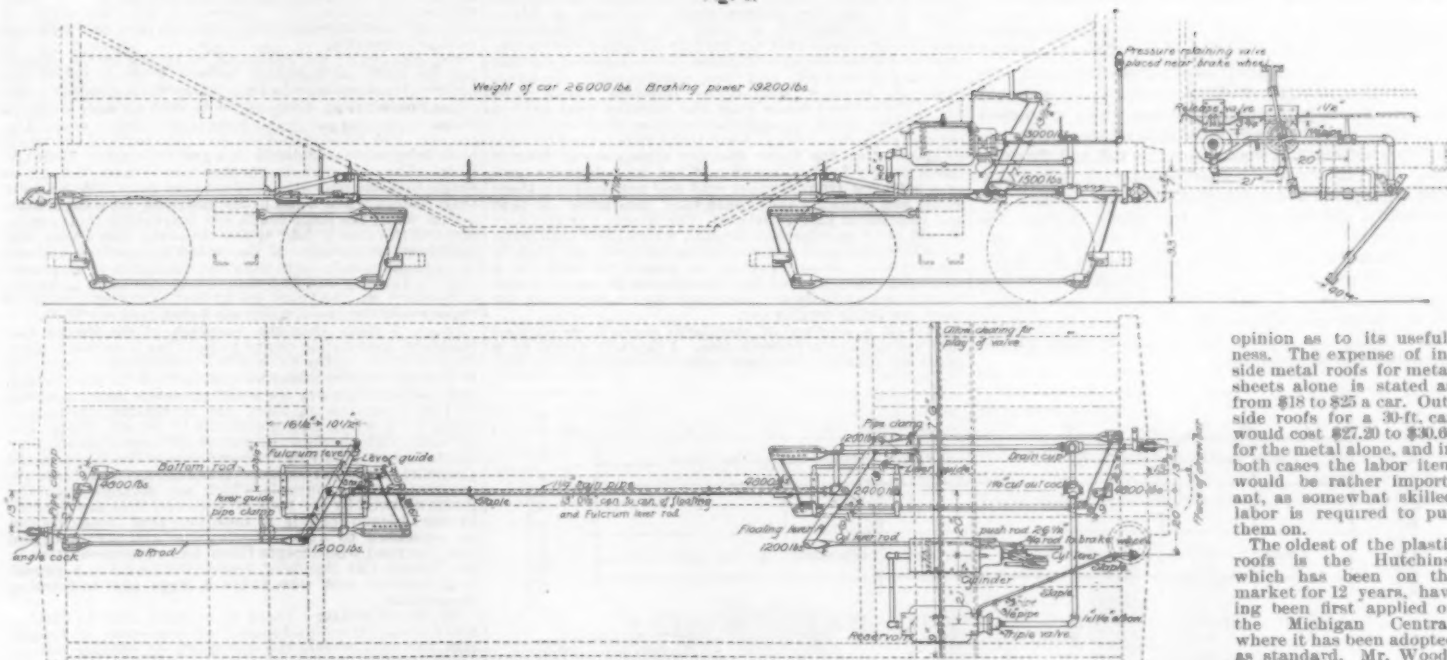


Fig. 1.

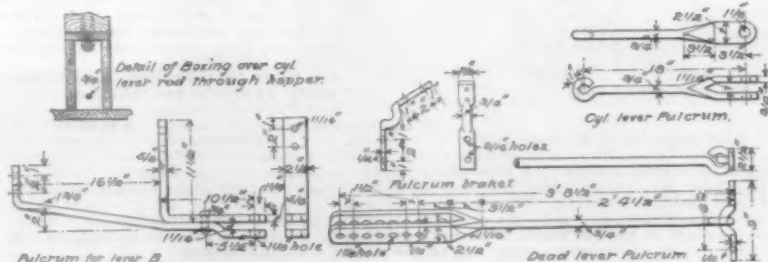


Fig. 3.

WESTINGHOUSE FREIGHT BRAKE GEAR FOR 30-TON HOPPER COAL CARS.

there will be, some time, another occupant of his important office and perhaps that individual would not be fit to wield the dictatorial powers which Mr. Norton himself might not abuse.

It is suggested that the General Assembly should enact laws regulating the transportation of dynamite and high explosives. Also that it should look into the matter of the union depot building in Columbus, O., where the supporting piers stand so near the cars that people sticking their heads out of the windows are liable to be hit. It is also recommended that the railroad companies be required to placard coaches carrying persons having contagious or infectious diseases.

The Commissioner has looked carefully into the question of highway crossings. He concludes that there are very many situations in the state of Ohio where it would be unjustly burdensome to the railroad companies to require separation of grades at such crossings, and that there are others in which it would be too expensive to maintain even a flagman or a gateman. He has investigated, therefore, automatic alarms, and speaks very highly of the O'Neill automatic highway crossing alarm, which was described in the *Railroad Gazette* of July 11, 1890. He has permitted the use of this device at various crossings, but has no mandatory powers, and now requests legislation empowering him to require suitable devices to be placed at highway crossings. The Pennsylvania Steel Co., the Hall Signal Co. and others who make automatic crossing alarms ought to keep watch of Ohio legislation.

It is suggested that the legislature look into the matter of trespassing on tracks. In large towns thousands of pedestrians use the railroad tracks as sidewalks, and it is almost impossible for railroad companies to prevent some casualties. It is the duty of the legislature "to do away with this needless sacrifice of human life by insisting that the trespasser does not have joint right on the track with trains."

It is recommended that a law be passed requiring the use of block signals; also that some legislative action be taken in the matters of air brakes on freight trains, and automatic couplers; also that a law be passed requiring the blocking of frogs and guard-rails.

During the year the Commissioner has inspected and approved 21 interlocking equipments for railroad crossings. Under the laws of Ohio trains are permitted to cross the tracks of other roads without first coming to a full stop, when the crossing is protected by interlocking approved by the Commissioner.

The investigations made by the Commissioner into the matter of train lighting, and his conclusions were mentioned in our issue of Oct. 16. He caused a careful inquiry to be made into the properties of Pintsch gas and

into the extent of its use in train lighting. He then personally inspected a Pintsch plant in New York, and formed the opinion that this is a safe illuminant, and it meets his full approval. He is satisfied that it is in the interest of the public safety, comfort and convenience, and should be early introduced. He also "spared no time, labor or expense" in investigating the Frost dry carburetor system, and concludes that if it be true that all the elements of danger are eliminated or guarded against, car lighting by this system is "beyond objectionable grounds." In concluding this topic the Commissioner says, "Safety, cleanliness, comfort and convenience all demand a radical improvement in the now inefficient and unsafe methods of train lighting, and the management and employees of railroads, as well as the traveling public, will hail with satisfaction such action as will finally bring about the desired result."

### Car Roofs.

At the last meeting of the Northwest Railroad Club papers on the subject of car roofs were presented by F. S. Woods, of C. B. Hutchins & Sons; M. A. Garratt, of F. W. Bird & Co. (Neponset Roofing); James P. Elmer, of Drake & Weir, and J. B. Quigley, of the Freight Car Equipment Company (Cable Iron Car Roof) of St. Louis. We have received portions of the paper read by Mr. Woods, which is given in a very much condensed form below. The data are said to be taken from the experience of practical car builders in all parts of the United States and from Mr. Woods' personal experience for ten years, three years and a half of that time having been given exclusively to car roofs.

Up to the year 1886 there were 10 types of roofs in the market, viz.:

Metal.—The Winslow, the Chicago Corrugated, the Empire Corrugated, the National, the Anchor outside iron, the Plain black iron outside and tin.

Plastic.—The Winslow Asphalt (or Drake & Weirs), the Hutchins composition.

The action of the Master Car Builders' Association in 1892, 1897 and 1898 is mentioned. The conclusions from

1886, 1887 and 1888 is mentioned. The conclusions from the reports of the M. C. B. committees were in general unfavorable to metal roofs, for various reasons that are stated in the report of 1887, and in 1888 the committee added to the conclusions of the former report that it is quite evident that the plastic type of roof is fast coming into favor. Since the report of this committee new roofs of so called plastic types and many metal roofs have appeared and are seeking a market. Among them may be mentioned: Murphy outside iron, St. Louis; Excelsior outside iron, St. Louis; Cable outside iron, St. Louis; Link outside iron, St. Charles, Mo.; Neponset paper, East Walpole, Mass.; S. E. Barrett & Co., Chicago; John G. Tait, New York; Philip Carey Manufacturing Company, Cincinnati, O.; Lee Composite Manufacturing Company, New York; Silicon Textile, Chicago, and some others, till the list almost equals that of the car couplers.

Inasmuch as the plastic type of roof is passing through an experimental stage, it is too early to give a decided

opinion as to its usefulness. The expense of inside metal roofs for metal sheets alone is stated as from \$18 to \$25 a car. Outside roofs for a 30-ft. car would cost \$27.20 to \$30.60 for the metal alone, and in both cases the labor item would be rather important, as somewhat skilled labor is required to put them on.

The oldest of the plastic roofs is the Hutchins, which has been on the market for 12 years, having been first applied on the Michigan Central, where it has been adopted as standard. Mr. Woods reports Mr. Miller, General Superintendent of the Michigan Central, as hav-

ing said that after a personal experience of every type of roof that had been brought out for 20 years, he considers the Hutchins the best and the cheapest ever used on a car. About eight or nine years ago it was brought into use on the Panhandle, and other railroads took it up, so that at present between 50 and 60 railroads have this roof in service on cars ranging from a small number in some cases to as many as 5,000 in others. This roof was at first used as repairs, but has gradually come into use for new equipment, until now the orders of the Hutchins Company average about 10,000 roofs a year. In the last six months of 1891 their orders were for over 8,000 roofs, 6,700 of which were for new equipment.

The composition which enters into the construction of the Hutchins roof is a distillation of pure pine tar which acts as a wood preservative, so that where roof boards come in contact with it they retain their soundness for years. Thus in the material itself and method of application the roof meets the requirements of the Master Car Builders' committee, referred to in the reports quoted, and is the only one in the market at the present which does so.

The following special advantages of the Hutchins roof are claimed over all other types, viz.:

1st. It is very much cheaper, stronger and more durable.

2d. Cheap lumber can be used where it is applied.

3d. In case of damage to the roof by accident, it can be repaired as easily as a double board roof.

4th. In renewing worn out roofs of the double board,

tin or outside iron types, the old under course of boards can be saved and utilized.

5th. In addition to box cars, it is especially adapted for refrigerator cars, ventilated fruit cars and all classes of stock cars, being a perfect insulator against heat and cold.

In reference to such types of roofs as are constructed with an air space and a single sheet of paper, the following objections have presented themselves in many instances:

1st. The top course of boards are only secured to small sub purline strips, said sub-purline strips being secured to sub carline strips. In switching it frequently occurs that cars are struck at one of the roof corners and the

that cars are struck at one of the roof corners, and the top course of roofing boards being the widest part of the car, it results in loosening the sub-carlines at their fastenings by breaking off the nails or screws, and when a good gust of wind gets under the top course of boards (as it easily can do), the whole top is blown away. This objection also applies to inside iron roofs, being more likely to happen in both cases, however, with new cars built at contract shops under the piecework system.

2d. The construction of the sub-carline requires the single sheet of paper to be placed directly on the under course of boards and securely fastened; on top of the paper are placed at regular distances of 2 ft. or thereabouts sub-carlines. The working of the car body in passing over frogs, switches, low joints, reverse curves and other inequalities of the track causes this sub-carline in many cases to cut the paper, from the ridge pole clear down to the side plate, thereby absolutely destroying its usefulness and permitting leaks.

3d. Where cars are thus fitted with an air space and any damage happens to the roof, it is difficult to make repairs without removing the entire top course of boards on one or both sides, because the paper is placed below the sub-framework to which the top course of boards is secured, and the paper cannot be patched or replaced until said sub-framework and top course of boards are taken off.

4th. The sub-framework requires from two to four extra pieces over each permanent carline, and six sub-purlines, necessitating that much additional labor and material in all new cars as well as old.

### Power Distribution.

The Société Industrielle de Mulhouse has arranged a competition for a project of distributing power from a central station in Upper Alsace, with a view of stimulating further study of this subject. The prizes offered are a gold medal of honor, and 2,500 francs for the best essay; the subject to be treated with special reference to the requirements of the industrial districts of Upper Alsace. The competition will close on May 15, 1892. Further particulars can be obtained by communicating with the society.

## An Experiment in Ties and Track Fastenings.

A piece of double track on the Delaware & Hudson Canal Co.'s line, just north of Waterford Junction, is to be laid with treated and untreated ties of various kinds and with several different kinds of track fastenings. The arrangement is shown in the diagram, from which it appears that either side of this two miles of experimental track is the standard track of the company, on oak and chestnut ties. The experimental portion is laid with yellow pine both unprepared and vulcanized, and with hemlock ties vulcanized and treated by the zinc-tannin method. On these several short sections the track will be laid with and without tie plates and with and without the Davies spike. Several kinds of joints will also be laid on this experimental section. It will be seen that quite a number of experiments will be tried on this length of track. It is expected that some of the questions which will be answered will be as follows:



Experimental Track on the Delaware &amp; Hudson Canal Company's Lines.

Beginning with the length of track marked A, in which unprepared and vulcanized yellow pine ties are laid side by side, those who are interested in the vulcanizing process may perhaps find the wear more than they might wish, and claim that if the joints had been supported on plates, this cutting would not have occurred. This objection would be met by the inspection of the  $\frac{1}{4}$  mile section marked B. Assuming that the cutting on section B proves to be considerable, the same gentlemen might claim that if each tie had a plate the result would have been different, and this claim will be answered by the  $\frac{1}{4}$  mile marked C.

The same line of questions and answers as between the value of hemlock ties prepared by the vulcanizing and zinc-tannin processes will be covered by the sections marked E, F and G, and the track in the vicinity of these sample miles being laid in the ordinary way and with the ordinary material, will furnish a basis of comparison between this ordinary track and any form of improved track included in the experiment.

The value of the Davies spikes and Servis tie plates will also be tested both absolutely and relatively on the different kinds of ties, and any value which special forms of joints tried may have, will be also brought out incidentally.

The track is a fairly good one, as to ballast, and is to be laid with new rail weighing 80 lbs. to the yard. The standard angle plate of the company has an exceptionally heavy section, with six bolts.

## The Drexel Journal Box Lid.

The cut shows clearly the construction of a new form of plate-steel journal-box lid which differs mainly from other sheet steel lids in the spring which holds it against the box. The following are the advantages claimed for it: The pressure of the spring is upon the centre of the lid and therefore is distributed evenly over the bearing surface; the pressure of the spring is about twice as great as that on other lids of this type; if the spring breaks the lid is unharmed and a new spring easily inserted makes the lid as good as new; it can be used on the M. C. B. proposed standard box of 1890, and can be adapted for the adopted standard of 1891.

This lid is sold by the Drexel Supply Co., Rookery, Chicago, and 29 Broadway, New York city.

## Master Car Builders' Standards.

At the January meeting of the Western Railroad Club the subject for discussion was Master Car Builders' Standards and Defect Cards. The paper of the evening was by Mr. D. L. Barnes on Recent Progress in Car Construction. The paper we have already published. The discussion on Standards follows, much condensed:

Mr. WAITT: It is singular to find what ignorance exists with regard to what the standard's are. In thinking the matter over there are two points that impressed themselves on my mind. One is that some action ought to be taken, either by the Master Car Builders' Association or others, to bring before the heads of mechanical departments of railroads all of the standards and to ascertain if they have adapted and are using those standards on their roads. . . . It behooves every head of a mechanical department on a railroad to take the standards up one by one and see if each one of the shops on his line is using them and using them exactly. . . . There ought to be copies of the standard or gauges

made by some reliable firm as the master mechanics' have of their tire gauges made by Pratt & Whitney. It is essential in order to have dimensions correspond where they are used by different companies, that they be obtained from some house selected for the accuracy of its work, and then distributed. We have, as we all know, a Master Car Builders' brake shoe. There are a dozen roads over the country that cannot interchange them, though they suppose they are following the pattern. . . . I can point to one road in New England that has three distinct standards of Master Car Builders' journal bearing. That was done by getting patterns from another road and not making them alike, and thinking they could vary this point or that and improve it just a little bit. The Master Car Builders should have one channel through which their standards should be distributed and not let the railroads get them in anyway they please. I think it would be well for a standard committee of that association to take up the matter of standards and ascertain by inquiry how far they are being carried out.

I think a number of standards ought to be adopted that are not at the present time. I think it would be a great advantage if we could unite on standards for tim-

arising from not using the best appliances. . . . This committee's report each year would have the result of making more railroads wish to come into the fold and use the standards.

Mr. FORSYTH: Mr. President, in regard to the standard car body, as proposed by you, I think one of the principal reasons why one has never been adopted is because lumber is so cheap and it is such an easy thing to shape it into the particular form that which is wanted in the car. You have stated the fact that parts of the truck have been made standards to a greater degree than the body. The reason of that is that iron is more difficult to shape into an odd size and it takes more time to do it than it does when wood is the material. Another reason is that when the large roads are increasing their equipment at the rate of four or five thousand cars a year, the individual standards of the roads themselves become more important to them than the standards of any association, and you will find that it becomes more and more impossible as the years go by and as the equipment of these roads increases, to obtain a standard car body.

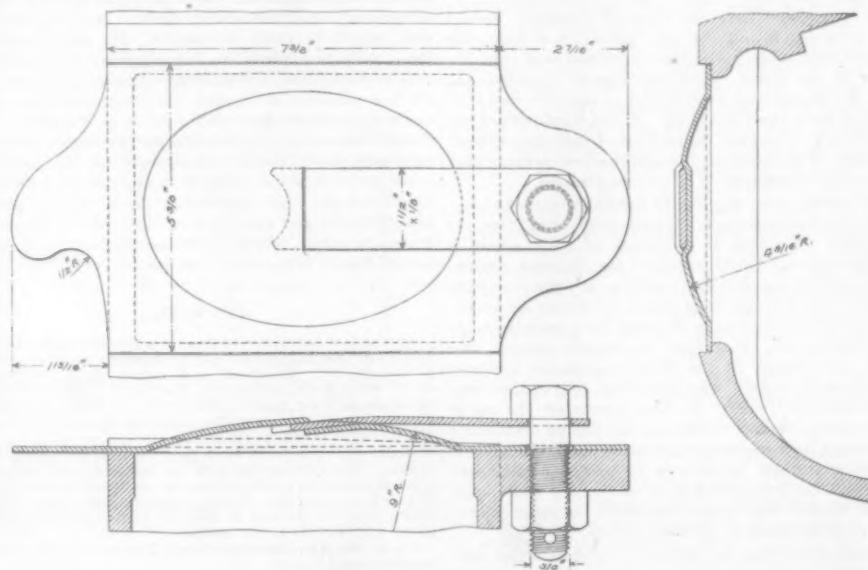
I think that the members of the Master Car Builders' Association ought to feel that it as much their duty to live up to the rules of interchange as a standard, as to maintain the material standards of the association, and I think there are as many offenders in a disregard of this obligation as there are in making castings or other work which do not conform to the standards. For instance, right here in the city of Chicago, I doubt very much if there is any rigid observance of the limits in the diameter of the car builders' standard axle. If cars are presented with journals which are smaller than the limits allowed by the book of rules and they are rejected by one Chicago road, it is notorious that those cars can be presented to a neighboring line and accepted, and that the road who accepts them has a representative in the Master Car Builders' Association, who is a prominent member and who takes a large part in framing these rules.

Mr. MACKENZIE: There is nothing that is further away to-day than uniformity of inspection of freight cars, and to illustrate the difference of opinion among master car builders I will give you a bit of my experience with them. In the month of September I issued a circular asking them their opinion as to what should be the charge for changing brake shoes and journal bearings. I received 57 or 58 replies. Fifty, I think, were in favor of waiving the charge for changing brake shoes and bearings, while others made a charge of 15 minutes or 30 minutes or an hour.

In the paper that Mr. Peck read before the meeting last month, he says he has known cars to have been refused and held several days on the sidetrack and afterward to be hauled back by the road that delivered the car.

I understand a great many roads are putting in a general inspector, with the purpose of obtaining uniformity of inspection on the line. I have done so; I have not been in the business long enough to know what the result will be, but whenever I hear of anything which needs attention at any point, I have the advantage of sending a man to investigate. When we say that the Buffalo inspection is thus, that the Chicago inspection is so, and another man says he doesn't care anything about those inspections or any other inspections, that he has a right to interpret the rules as he thinks fit, how are you going to agree upon the material points? Let us have uniformity of inspection first. It seems to me that this is the first thing to strive for in our club meetings.

President PECK: I will say, Mr. MacKenzie, what you and Mr. Forsyth said is good, but the car being passed back as mentioned is the way they do business in Chi-



Drexel Journal Box Lid.

ago because they do not live up to the rules and do not propose to. We tried once to get uniformity by establishing a joint inspection for the city, but did not succeed. I have had people say that their inspectors would card if asked, and at the same time you can go into their inspector's house and see a notice forbidding them to do so. I think that at most inspection points they try to do too much business for the men employed.

Mr. CLOUD: There is one point I think might be brought to the attention of the club, and that is that arrangements were made by the Master Car Builders' Executive Committee some years ago to secure brake heads and shoes in accordance with the standard drawings, and that they had a company to furnish these standards. It is true they made a mistake in the patterns and had to take them back again, but it does not follow that they continue to make the mistake. In regard to the general matter that has been discussed here, it seems to me you are mixing up Master Car Builders' standards with the rules of interchange and trying to discuss them both together. But in regard to the Master Car Builders' standards which I thought was the subject, there are many which do not require castings. You can get at the standards by following the drawings.

It would also be much more beneficial to all concerned if the agitation for legislation compelling the use of so-called safety appliances took a different turn, and instead of legislation compelling the adoption of certain devices, there was some sort of a censorship established which would report to the public the disastrous results



The introduction of these standards, all of which can be followed easily, is an important thing and ought to be agitated more than it is, and I believe that a committee of the Master Car Builders' Association should have this matter in charge. In order to get the best results, that committee should work in connection with the management and have general managers approve of the standards and appreciate their importance, and thus insure their use when ordering new equipments.

#### Compound Locomotive for Fast Passenger Service.

Some time since we stated that the Baldwin Works were building a fast, 8-wheel compound with four cylinders for the Central of New Jersey, and we now give a cut of it and a description of the main features. This engine is remarkable in being the first really fast 8-wheel compound built in this country. It is being run in a difficult service and one which has proved almost too much for the single expansion engine of the best class. The schedule time is 2 hours and 15 minutes for the 90 miles between Jersey City and Philadelphia, including about nine stops and several slackenings. The trains vary from four to nine cars.

On Wednesday last this engine made the run from Jersey City to Philadelphia with the Blue Line Express, of eight cars, weighing, with the locomotive, about 430 tons, and made the distance in 2 hours and 7 minutes,

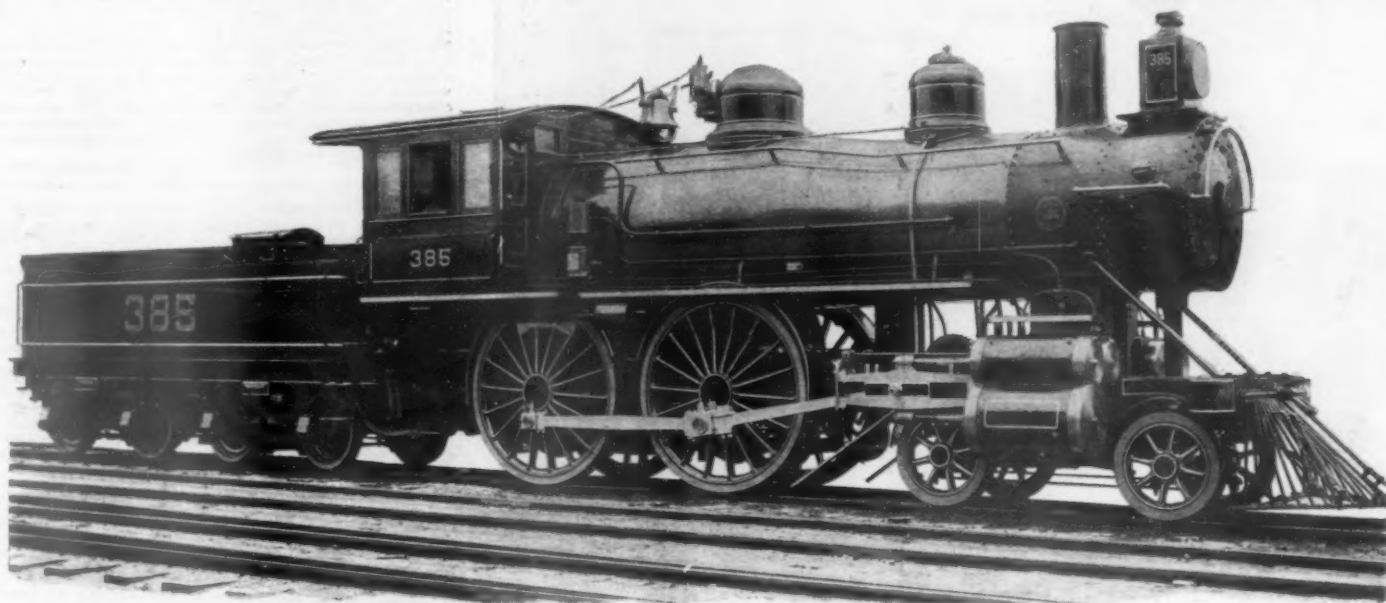
high pressure cylinder and vary the power with the throttle lever, as there is under such conditions a much freer exhaust. On the Baldwin compounds the quadrants for the reverse levers have no notch for cut-offs less than one-half stroke. The following are the general dimensions of the engine:

Fuel.....	hard coal.
Gauge.....	4 ft. 8½ in.
Cylinders.....	13 in. and 22 in. × 24 in.
Drivers.....	78 in.
Total wheelbase.....	22 ft. 3½ in.
Driving wheelbase.....	7 ft. 6 in.
Total weight, in working order, with three gauges of water in boiler.....	123,800 lbs.
Total weight on drivers.....	88,400 "
Steel boiler, diam.....	58 in.
Tubes, 250.....	2 in. diam.; 11 ft. 10 in. long.
Firebox, 131½ in. long, 42½ in. wide and 65 in. deep at front and 55½ in. deep at rear.	
Water space.....	3 in. sides and back and 4 in. front.
Staying of firebox crown.....	by radial staybolts.
Truck wheels.....	36 in. diam.
Truck journals.....	5½ in. × 8 in.
Driving wheel centres.....	72 in.
Driving axle journals.....	8 in. × 12 in.
Tank capacity.....	3,300 gallons.
Tender wheels.....	36 in. diam.; journals, 5 in. × 8 in.
United States metallic packing for piston rods and valve stems.	

In the blacksmith and machine shops, besides the car work, split switches, frogs and crossings are made and repaired. The wood working tools are all modern, embracing the latest improvements; and so well have they been selected and placed in the shops, that manual labor has been reduced to a minimum. The iron working tools are new and include recent improvements. Nearly all of the tools were supplied by the Niles Tool Works, which made most of the iron working tools, while those for working wood were made by the Berry & Orton Co.

Power for operating the mill and running the dynamo is furnished by a 150-H. P. Buckeye engine, while a 20-H. P. engine supplies the power in the machine shop. The steam heating plant includes three boilers and the necessary piping and radiating surface in all of the buildings. It was installed by Chas. H. Parmelee, of St. Paul. The buildings are all lighted by electricity, the Edison General Electric Company's incandescent system, with a capacity of 500 16-candle power lamps, being used. Shavings and dust are collected and conveyed to the shaving tower by a plant constructed by L. H. Day, of Minneapolis.

The following buildings comprise the plant: Storehouse and office, 49 × 182 ft.; blacksmith and machine shop, 49 × 250 ft.; car repair shop, 150 × 300 ft.; paint shop, 100 × 300 ft.; wood working shop, 70 × 257 ft.; boiler house and



VAUCRAIN COMPOUND FOR FAST PASSENGER SERVICE.

Built for the CENTRAL RAILROAD OF NEW JERSEY, by the BALDWIN LOCOMOTIVE WORKS.

including nine stops and several slackenings. On the return trip on the same day, with four cars, she made the distance in 2 hours and 15 minutes, including 10 stops and a number of small delays of from 2 to 4 minutes. At every station she was held to prevent getting ahead of time.

Those who have been skeptical about the possibility of making fast time with a compound should take a ride on this engine as an object lesson. Mile after mile is traveled in 48 to 40 seconds, which corresponds to speeds varying from 70 to 90 miles per hour. This is done without effort and a higher speed could be readily attained if the distance between curves and other slowing points would permit it. The balancing is as nearly perfect as may reasonably be expected and the engine rides much better than locomotives generally do. Leaving Elizabeth towards Jersey City, the speed is maintained at 60 miles per hour; and altogether a ride on this engine making schedule time is not without apparent danger, which produces a lasting impression on one unaccustomed to daily experiences of this sort. The track seems like threads of polished steel and the cross-ties appear to blend together when one travels over them at a speed of 90 miles an hour. One cannot help having an increased respect for wood as a material of construction when he sees the wooden ties guide a 60-ton engine around a comparatively sharp curve at 70 miles per hour speed. The value of a good signal system is better appreciated after a ride at such high velocities, when it is realized that it would be a quick stop to bring the train to rest in 2,000 ft. The custom with this engine is to bring the train under control and reduce the speed about a mile away from the station where a stop is to be made; 2,000 ft. is a long distance to make a signal certain under all conditions, and particularly on roads where passing locomotives fill the air with steam and smoke. On the New Jersey Central the automatic electric signals east of Elizabeth are liked by the engineers, as they give increased confidence and indicate directly if there is a train ahead.

During the fast speed last Wednesday night the engine was run with a cut-off of 13 in. in the high pressure cylinder and 180 lbs. of steam. For extremely high speed with a compound it is better to cut off late in the

American, outside-equalized brake on drivers, operated by air in connection with Westinghouse air brake.

Westinghouse air signal.

The recent service of this engine proves the usefulness of the Vaucrain compound for fast passenger work; its value for freight and local passenger has already become a matter of exact record. It will be remembered that the Franklin Institute awarded some time ago a medal for originality for this design of compound cylinder for locomotives. Before long this engine will be tested to determine the coal consumption per ton-mile at high speeds. It is now estimated to be about 66 lbs. per train mile at an average running speed of 60 miles per hour, or 1½ lbs. per ton-mile based on the run made last Wednesday. Altogether this is one of the most interesting engines we have illustrated.

#### St. Cloud Car Shops, Great Northern Railroad.

These shops are between the main line and the Willmar branch, about two miles from the St. Cloud station. All of the heavy repairs to freight and way cars are made here. The plant includes five buildings and was completed during the spring of 1891. About 200 men are now employed.

There are six miles of tracks in the yard, permitting sorting the cars with reference to the nature of repairs to be made. If the repairs are mainly iron work, the car is placed on one of the north tracks in the car repair shop, as the blacksmith shop is north of the latter. If wood work predominates in the repairs, the car goes on one of the south tracks nearer the mill, and when the repairs are heavy, embracing both classes of work, the car is set on one of the centre tracks. There are six tracks in the repair shop, with room for 36 cars. The paint shop is on the same level as the repair shop, and a short distance beyond it. Cars pass through the repair shop, and are moved into the paint shop by a horse trained to do the switching about the plant. A stock of material to be used in the repair shop is kept there, and is charged by those having supervision of the work to the particular car upon which it is used. In this way an immense amount of detail in the store department is saved.

engine room, 38 × 55 ft. All of the buildings have granite foundations, walls of yellow brick, and pitch and gravel roofs. Fred Althen, of St. Paul, was the general contractor. The general supervision of the plant, which is well arranged and fully equipped, rests with Mr. W. V. S. Thorne, Superintendent of St. Cloud shops.

#### The Life of Railroad Ties in France.

As of further interest in connection with what appeared under the above head in our issue of January 22, we give the appended data. They are taken from a discussion by Alfred Birk, in the *Zeitschrift* of the Austrian Architects' and Engineers' Society, of statistics for several years past, prepared by Henry Michel, Chief Engineer of the Southern Railroad of France.

From this it appears that in 1889 the total length of track operated by the six large railroad companies of France amounted to 44,548 kilometers (about 27,664 miles) and the total number of wooden cross ties necessary for proper track maintenance was 2,372,079, making for each kilometer (1 kilometer = .621 mile) 5,329 ties renewed. Assuming that for each kilometer of track there are 1,200 ties, we have, for the year 1889, renewals to the extent of about 4 per cent.

Since 1883 the consumption of ties on the several lines decreased up to the year 1887, amounting in the later year to less than one-half the consumption in 1883. Since 1887 the consumption has been nearly constant. Besides the reasons already assigned in our earlier article for this falling off in the consumption on one of the roads, it is pointed out by Mr. Birk that during the earlier years tie renewals were probably made with less discretion than now, and that, subsequently, the limits of usefulness of the ties, consistent with safety and good working, were extended and greater economy in renewals was thus secured. It would seem probable, too, that latterly greater care has been exercised in the selection of timber for ties, and that better measures have been taken in treating the ties by some of the various preservative processes. There has further been much improvement in later years, as previously stated, in the character of the roadbeds, so that altogether the greater economy in tie renewals during the latter part of the decade may be accounted for with reasonable certainty.

Mr. Birk shows, further, by comparison with other tabulated statements of the consumption, that previous to the year 1885 the consumption for renewals alone reached the full productive capacity of French timber lands—in fact, exceeded it in some instances—while, since that time, and notwithstanding the increased mileage of road, the consumption has fallen to three-fourths of the producing capacity. In view of this circumstance, Mr. Birk thinks it unlikely that much progress is to be expected in the near future in the introduction in France of metal ties. As a matter of fact, he points out, metal ties to the number of 30,000 have been laid down experimentally only on the lines under government control.

#### Electrical Equipment of the Edison Shops, Northern Pacific Railroad.

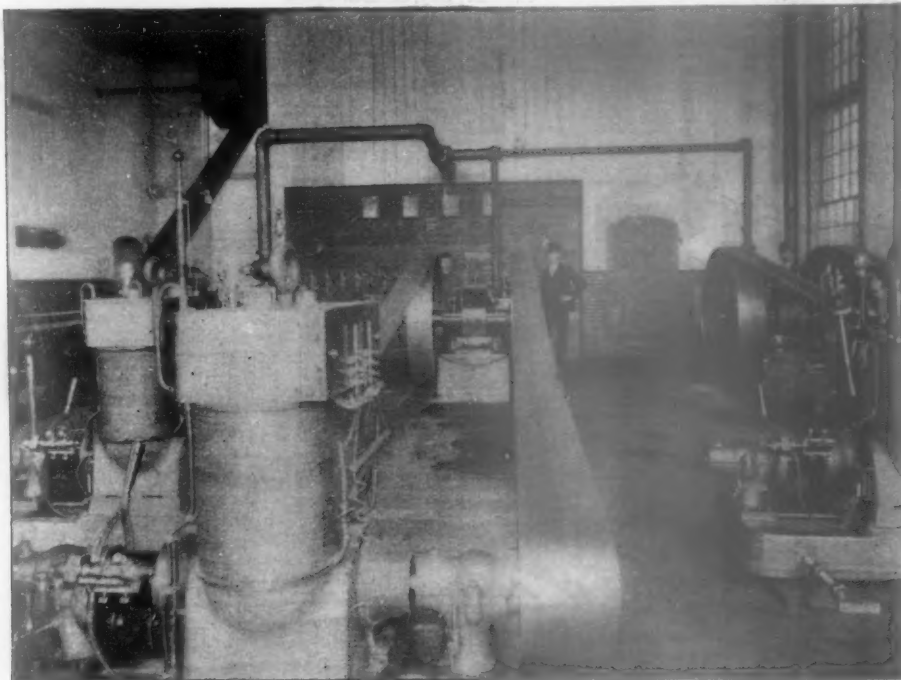
In our issue of Oct. 30, 1891, we gave a detailed description of the new construction and repair shops of

a 2,000 C. P. arc lamp which affords ample light for working the tables at night.

The incandescent lamps throughout are so distributed as to throw the best light on the work of each machine, and the electric lighting has given great satisfaction. Electric signals also connect the different shops with the engine room. The installation was made by the Pacific North Western District office of the Edison General Electric Co.

#### American Railroad Statistics as Seen By a Scotchman.

In a recent issue of the *Glasgow Herald* appeared a short review of the advance statistical report of the Inter-state Commerce Commissioners. That our readers may know how we look from that point of view we give some extracts from the *Herald's* article. Some of the comparisons made are commented on in the editorial columns.



Dynamo and Engine Room—Northern Pacific Shops.

the Northern Pacific Railroad erected at Edison, Wash., near Tacoma, dwelling more especially upon the steam equipment, engine facilities, building details, etc. We were unable in that article to give more than a passing glance at the electrical equipment, which of itself is a complete and interesting installation.

The little town of Edison was named after the well-known inventor, and it would seem only proper that his system of electrical lighting and power transmission should be used in what is the nucleus of a populous district. The electrical plant consists of four 25-K. W., 125-volt Edison dynamos of the well-known incandescent standard type. These are coupled directly to two 12½ × 12 McIntosh & Seymour engines. These machines furnish the current necessary for 100 incandescent and two arc lamps, and provide power for the operation of two electrical transfer tables, one 50 ft. and the other 70 ft. long. At the back of the engines is the switchboard, so arranged as to permit the use of either pair of machines on power or light circuits, or in multiple series, the motors, of course, being connected upon the Edison three-wire system throughout.

Each transfer table is equipped with a 15-H. P., 220-volt, Edison motor of the ordinary railroad type, geared by four reductions to one axle of the table. To these motors, a separate circuit is run from the switchboard, so arranged as to be always on the outside of either two machines. To avoid the objectionable feature of wiring the entire system when power and light circuits are running together, the double trolley system is employed. The range of travel of each of these transfer tables is 325 ft. The larger transfer table is placed between the coach and paint shops and is connected with the main yard track at either end and with 10 tracks running into the two shops. The smaller one is placed between the boiler and machine shops and connects with the same tracks as the other table, so that a car or locomotive may be transferred from one end of the shop to the other by merely running it upon the table and running it off again. The table is also provided with a drum and cable for hauling cars on or off. These tables seem to work with as much ease as an ordinary street car and are certainly one of the most noticeable features of the entire installation. Although exposed to the most inclement weather for some months past they take a heavy locomotive from one end of the shop to the other apparently without effort. At one end of each table is

The average charge per ton-mile was 0.941 cent = 0.4755 pence, and the average expense per ton-mile was 0.604 = 0.302 pence. This is the average charge and cost per ton mile on all the railways in the United States—good, bad and indifferent. But the part that interests us the most is the lowest cost of moving traffic. This is to be found on the Norfolk & Western, where the expenses per ton mile were only 0.379 cent = 0.189 pence—being less than one-third the cost of moving freight traffic on the far better railways of Great Britain.

the Board of Trade for 1890 the average earnings of each locomotive were only £4.714. The London & North-Western seems to be below this average, their locomotives earning an average of only £4.376; while those of the Glasgow & South-Western were £3.892, the Caledonian £4.541, and the North British taking the cake, £4.758.

During the sitting of the Board of Trade Commission and the joint Parliamentary Committee on Railway Rates and Charges, neither of these bodies would permit comparisons of rates to be made between the railways of the United Kingdom and other countries. This seems to have been a mistake, as we have to compete with American rates on many things. The rates on breadstuffs from Minneapolis to New York, 1,400 miles by rail, is 35 cents per 100 lbs.—£1 11s 10d a ton of 2,240 lbs., and from New York to London 18s, making £2 8s 10d freight charges for 5,400 miles; while the charge on breadstuffs from Perth to London by rail, a distance of 450 miles, is £3 1s 3d per ton. It will thus be seen that the farmer of the most distant parts can compete with our own, and that agricultural interests must necessarily, if rates in foreign countries go much lower, suffer still more. Our railway rates show no change for years, while the rates of other countries are continually on the decline, their traffic on the increase, and yet dividends are maintained.

Examples are given of the reductions in freight rates in 20 years on the New York Central and of low rates and reductions in cost of handling freight on the Norfolk & Western. The *Herald* continues:

From these facts and figures it does seem as if improved rolling stock had much, if not all, to do with reducing working expenses. But we are told by our railway men that here we have so much small traffic that it is impossible to get large loads, and that another advantage they have in the States is the long distances they have to haul. We have shown that the average distance a ton of freight is carried on American railways is only 119½ miles, and that all freight traffic is conducted in long bogie truck wagons. We take some statistics relating to the London & Northwestern and in comparison with the New York Central show wherein there are other anomalies.

	N. Y. C.	L. & N. W.
Ton mileage	3,098,418.741	1,367,565,316
No. of locomotives	1,132	2,670
Earnings each locomotive	£5.419	£4.879
Earnings per ton per mile	0.374	1.721
Working expenses, ditto	0.285d.	0.658d.
Average dividend for 21 years	6½ p. c.	...
Dividend 1891	...	7½ p. c.
Freight, rolling stock, bogie wagons	...	...
Four-wheeled wagons	39,978	33,082
Average number of tons carried on each wagon	7.14	2.3
Average number tons carried per train mile	250	71
Percentage min. rail traffic	30.4	77.2
Percentage of goods	69.6	22.8

Though fuel and labor are double the price on the New York Central that they are on the London & Northwestern, the average charge for moving traffic is 43½ per cent. less than the first cost of working traffic on the London & Northwestern Railway.

#### A Job of Re-location.

An interesting bit of re-location is now in progress on the New York & Canada Division of the Delaware & Hudson at a point about four miles north of Crown Point. It consists of moving westward and nearly parallel with its former location, about 4,000 ft. of line. The line as at present operated was originally located along the face of the rock bluff and on the shore of the lake, partly in side cut and partly in fill. About 300 ft. of the embankment settled two years ago, moving toward the lake, eastward, the total subsidence being about 20 ft., and the lateral movement toward the lake being about 40 ft.

It was found upon sounding, after the subsidence,



70-ft. Transfer Table—Northern Pacific Shops.

This transfer table is between the coach and paint shops. The coach shop is shown.

The average number of passengers carried one mile by each locomotive was 1,413,142. This number, multiplied by the average charge, 2.167 cents = 1.084 pence, gives £3,387 as the annual earnings of each passenger locomotive.

The average tons of freight carried one mile by each locomotive was 4,721,627 which, at the average charge of 0.641 cent = 0.4755 pence, gives £2,305 as the annual earnings of each locomotive. These earnings seem extraordinary when compared with the earnings of the United Kingdom. According to the railway returns to

that this bank rested upon a crust of clay about six feet in thickness, resting upon a bed of quicksand and thin mud which has apparently filled what was formerly a bay, of which the rock bluff was the shore line. The soundings show that the angle of the face of this bluff is so abrupt as to furnish little or no support to the overlying material, so that the weight of the bank produces a tendency both to settle and to move laterally, and the abruptness of this rock face of the bluff seems to



prevent any satisfactory method of securing a safe road-bed, except by transferring the entire line to solid rock excavation.

The nature of the work will be a thorough cut through the solid rock, varying from 5 to 40 ft. in depth. The contract has been let to Mr. James Shanahan, of Tribes Hill, and he has retained a part of the work for execution by himself and let a part of it to the Drake &



\* Full lines show condition before settlement from a to a'; dotted lines show present condition and rock cut.

Stratton Company, Ltd. It is being pushed by both contractors and it is expected to be completed early in the coming spring. The total amount to be excavated is about 30,000 yards of solid rock, and considerable, though less, embankment. The line at present is carried upon a trestle across the morass in which the bank sank.

The condition of the surface in the vicinity of the bank after its settlement was a matter of interest as demonstrating the certainty of a balancing of any over-loading of poor material, since the surface between the bank and the lake shore (about 350 ft.) was entirely undisturbed, and a roll or wave of material was forced up through the surface of the water in the lake outside of this 350 ft. of distance, this roll being about 15 ft. in height and 100 ft. in width and parallel with the embankment. It seemed evident that the semi fluid material which had formed the foundation for the bank had sought for the weakest point in the overlying clay and vegetation, and had found it first just outside of the shore line, and under water. The action of the water has, since the settlement of the bank, removed a considerable part of this balancing roll, or wave, and it is thought, from observation in the vicinity, that this phenomenon has occurred before in the past, a bank having settled apparently many years ago, forming a balancing wave which, in the course of time, has been obliterated so that the conditions necessary for equilibrium did not exist; these being re-established two years since by the formation of the new wave which is now in the process of obliteration again. In view of these facts there seems to be no course consistent with prudence, except to incur the expense of removing the road bed to a foundation of solid rock, and this therefore is being done.

#### Plain Millin Machine.

The machine illustrated is the No. 4 plain milling machine of Brown & Sharpe Manufacturing Company. It is described as follows:

The overhanging arm supports the outer end of the cutter arbor, either on a centre or in a bushing, and may be rigidly connected with the knee by an arm brace. The spindle boxes are bronze. The saddle rests directly upon the knee, and the platen is heavy and moves only at right angles with the spindle. It has three T slots, and is surrounded by a channel for oil. The platen is 32 inches long and 7 inches wide. It has an automatic feed of 20 inches, and may be stopped automatically at any point while moving in either direction. It can be lowered 18½ inches from the centre of the spindle, and the saddle has a movement 6½ inches in line with the spindle. The greatest distance from the centre of the platen to the face of the stand or knee slide is 11 inches. There are six changes of feed, varying from .008 to .100 inches per revolution of the spindle. The floor space is 64½ x 44 inches, and the weight, boxed ready for shipment, 1,850 lbs.

#### Railroad Location—Notes in the Field.

[Mr. Gillette is aware that much of this paper, particularly the first part of it, is quite elementary and familiar to all experienced field engineers; but he thinks that even the elementary part will be useful to the younger members of the profession and appreciated by them. In this we quite agree with him; while the principles laid down cannot be too often rehearsed or too firmly grasped. Therefore we are glad of the opportunity to publish his paper.—EDITOR.]

A party fitted out to locate railroad lines here in the west consists, as a general rule, of a chief of party, transitman, leveler, topographer, draftsman, two chainmen, a rodman, assistant topographer, two axemen, a stake marker, blackflag, cook and three teamsters. The chief of party is solely responsible to the company for the success of the survey and the operation of the party. The transitman must be quick and accurate in the use of his instrument, for on him mainly depends the progress of the party. The working of the party is in the hands of the transitman during the absence of the chief. The leveler must be able to keep up with the transit party in his work, and should adopt at once some code

of signals with his rodman, in order to repeat readings on his turning points. This saves much time and is less liable to error than the old practice of shouting the readings and checks. It is very painful, especially on a windy day, to see a leveler and rodman running toward each other to check up or give readings on the rod. The leveler plots the profiles and assists in computing the quantities. The topographer takes slopes, sketches in the contours and drainage, gets property lines, connects the line with corners of the government survey, and runs out drainage areas. He is supplied with a transit and measures distance with thestadia wires on a twelve-foot rod. The number of acres contained in the drainage areas determines the size of culvert necessary. In the larger drainage areas, where a bridge is unquestionably required, it is not necessary to determine the area. The old way of guessing at opening required is done away with; there is little chance here to put in a bridge where a small culvert will perform the work, or vice versa. The topographer with his transit can also be used at times running grade lines, thus greatly facilitating the working up of a country.

The chain is checked twice a week, in order to keep it of uniform length. At the first checking in a camp,

compared at some signal station before starting out) should be used at all points, the altitude of which might have a deciding effect on the route. The meteorologist keeps up a strict record of observations with his instruments, and his work is compared with that of the nearest signal service station as a base. The topographer carries a light mountain transit, cross sights points, takes angles of elevation and depression, sketches in the contour of the country, checks odometer readings by his three-point stations and has charge of the party. A map based upon such data, giving distances, roads, trails, camps with notes regarding wood, water and grass, would be of great assistance to the locating engineer. As a base for comparing lines, he should be given a value for savings in distance, curvature, rise and fall, bridging and snow cuts besides the usual prices of graduation.

The work of a locating party will be at first slow and inaccurate, but this will soon mend or changes should be made. Great care must be used to have the work accurately performed (mistakes are, as a rule, not excusable), for on this depends the progress and success of the party. The most accurate men are generally the quickest at field work. Few errors are ever made by a

well-trained party, either in instrument work or chaining. Accuracy is the keynote to success. It gives speed to the party and the line desired. When lines do not check in the field, or the map is not accurately made, it is impossible to make good use of the work of the party, or benefit properly by what has been done in laying out new lines.

All preliminary lines should be run before location is commenced. This is a very good rule to bear in mind, but one too seldom carried out. Care must be taken to have each preliminary line show the best for its route, otherwise it is worse than useless, for it is misleading, and the best route may be condemned by a carelessly run line. Bear in mind that the preliminaries are the foundation for the location. The proper way to run a preliminary line is to have it show up the best for its particular route. Lines run on this principle give each route its proper value, and the comparison points unerringly to the best route to be adopted.

After the country has been thoroughly explored so as to demonstrate, beyond a doubt, that the line selected is the best route the country affords, a preliminary location is made, and from this the location is placed. It will be found that this location will require slight changes in many places before the line can be considered as final or ready for construction. The line, as finally placed, should be impregnable, that is, the locating engineer should be able to demonstrate beyond a doubt that his line is, first, right as regards the route; and secondly, that the details have been carefully considered. He can much better afford to neglect the second than the first; details are apt to be righted; but a mistake, as regards route, is much more difficult to discover or remedy.

Inaccurately run lines are very expensive and ultimately lead to disastrous results. Too much stress is sometimes laid on the saving of time and the real object of the party given a secondary consideration. A chief of party should never hesitate to back up on his line when a saving of value can be made, for fear of demoralizing his men. When such is the case, the party is not well trained. When the locating engineer sends in his line, it is open to inspection by other engineers. If he is not able to furnish facts sufficient to demonstrate his route as the most practicable, or has left a part of the country he has gone over in doubt, a new survey may be ordered, a better line found and a few hundred thousand dollars saved the company. This proves that poor work has been done; the location was commenced before the preliminary work was finished. It may be that the effort to gain a reputation for speed has clouded his object in being in the country, and he has left a part of the country in doubt as to its possibilities for his route. One such error may be sufficient to relegate him to the ranks where he will have less opportunity to make costly mistakes.

There is no revelation or trick in making a location; there is plenty of hard work even in an apparently easy country, for here one is limited to a very light grade which will often puzzle the engineer to maintain, as much or more than his heavy grade in the mountains. The "old timers" at locating railroads, who can run in a curve as well by the eye as they can be run with an instrument, who have only to glance at a country to determine the best route, are of the past. Divisions of the very lightest possible grade are sought, compatible with reasonable work and distance. Curves are spiraled on a uniform basis; the work is more systematized, and facts are more freely sought. Individual judgment by wholesale is being narrowed down, and reasons can be more often given for not taking certain other routes



No. 4—Plain Milling Machine.

three hubs are driven in line 50 ft. apart and a tack accurately set in each hub, by measurement with a steel tape. The chain is stretched over these hubs and made the proper length. These hubs are convenient for subsequent checkings of the chain at that camp.

The draftsman plots the lines of survey, making such maps and sketches as may be desired to illustrate the work. All lines are plotted by computing the latitude and departure of each angle point, as this system is found more accurate and convenient in making up notes for lines to be run in the field, which shall occupy the desired ground.

Two teams, called "line teams," are used to take the party to its work and back to camp at night. Stakes for the line, lunch for the party and water kegs are carried in the wagons. The third team is used for hauling supplies and fuel for the camp. The driver of this team keeps a general outlook for articles misplaced or liable to be lost about camp, assists the cook in keeping the supply tent in order, and occupies his spare time making stakes.

Six tents, 14 ft. x 14 ft., are used during the winter; two for sleeping tents, a cook tent, supply tent, and two for the teams and one or two saddle horses with which the camp is generally supplied. In summer the horse tents can be dispensed with.

The chief of party is given the best maps extant of the country he is working in, with his route sketched approximately thereon, and on such other sketches as the company may have which will aid him in his work. If a good reconnaissance has been made of the country, covering great length of line, much time and money will be saved. The maps will be valuable to the company and the locating engineer.

For reconnaissance a small party, mounted, consisting of a topographer, meteorologist and odometer recorder, with two packers and a cook would be able to run 400 miles of line per month. Cistern barometers (carefully

about which there might be a question. Railroad companies are beginning to appreciate the fact that in competition the one having the lightest grades and curves can handle goods cheaper and make the best time; elements, it is safe to say, which have not been sufficiently considered in many railroads built up to the present time. How great an influence this will have on their future earning capacity remains to be seen, but it is becoming more apparent each year. A locating engineer is responsible not only to the company whose money he is trying to save, but to every one tributary to his line. The cost of the road and its cost of operation have a decided effect on rates; the country is benefited to its greatest extent by a practically perfect location, or handicapped by a poor one. The responsibility of location reaches as far as the pocket of the poorest settler in the vicinity.

Should the locating engineer be compelled to make a location without the use of preliminary lines, he is indeed fortunate in securing approximately the best line. When such a case arises he leaves the party in charge of the transitman to be moved to the desired place, hastens to his objective point, examines as closely and thoroughly as possible the country, determines its grades with his slope level and fortifies himself as much as possible regarding his work until the party arrives, with instruments carefully adjusted and a good supply of stakes. Location is at once commenced, the gradient or vertical arc is freely used for maximum grade, care is taken to give sufficient room for the curves around points, and the engineer, by means of foresights, directs the location. By good judgment, with his scant knowledge of the country, he may be able to pull through in a creditable manner. Mistakes here do not react so strongly against him, but success greatly enhances the value of his judgment.

It is fortunate, however, that this class of work is fast becoming a thing of the past. The writer has located over 1,500 miles of line, 700 of which has been constructed and is now being operated; a part of the rest is now under construction. It has taken from three to five miles of preliminary lines to establish one of location, and over seven years' time in the field to perform the work, with a good party.

A great number of locations made by other parties have been inspected and others noted. Where care, judgment and unflinching zeal has not been manifest to get the best the country affords, the result has been poor, and a new location made with often a most surprising betterment as regards maximum grade, curvature, distance and work. It is a simple thing at times to get a better line than the one run, but it is an entirely different matter to get and to know that one has, the best there is in the country. This must be the mark of every locating engineer, and he is to be satisfied with nothing less. The more experience one has on location, the more apparent it becomes that it is exceedingly easy at times to be led astray and serious mistakes made. The more rigidly his system is enforced, the less apt is he to be deceived, either by "ocular illusions" or errors of judgment.

A frequent source of error is assuming too much on meager facts, and not taking time sufficient to demonstrate thoroughly the problem being worked out. It has been my experience that it takes some time and considerable work to make one familiar with the grades of a country, and on moving to a new field of work the same thing has to be gone through again, little benefit apparently being derived from the former experience. It is folly to assume, to any extent, the work of one's instruments; that bane of all locating engineers, an "ocular illusion," is ever present, ready to mislead. Trusting implicitly to one's instruments and their frequent use, even where one feels certain of results, is the only safeguard. A prejudice in favor of certain lines to the exclusion of territory as yet unexamined is to be resisted, and an ever present distrust of oneself is absolutely essential to continued success. Some locating engineers will make a good location in one place and a poor one in another. They happened to strike it right in one instance and wrong in the other. The idea is to limit chances as much as possible. The lack of a rigid enforcement of well known rules and the constant temptation to take chances in order to save time is the stumbling block to many.

The writer cannot help but think that the standard of economy practiced on location is far below that on construction. The price of graduation is reduced to a minimum. A better location or a more polished one would frequently enable a company to pay a better price to contractors, with a considerable saving to itself. It is a duty it owes to the people, as well as itself, not to be handicapped with a poor line. A thorough inspection and greater care in making locations are becoming more and more essential.

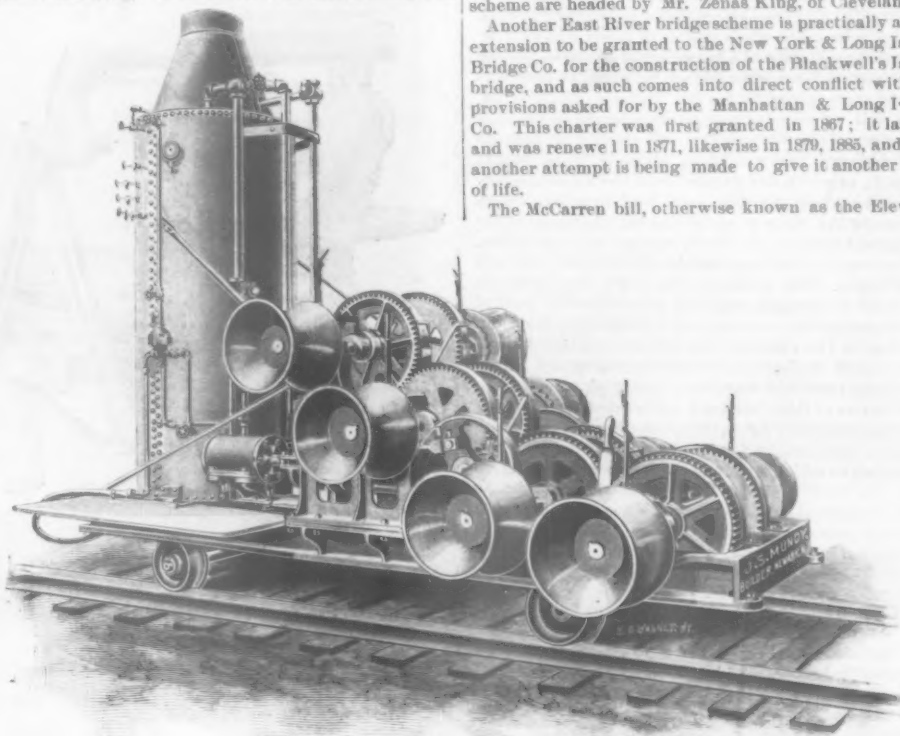
EDWARD GILLETTE, JR., M. Am. Soc. C. E.  
IN CAMP, May 30, 1891.

#### Cold Storage in Paris.

Paris is shortly to have a freezing and cold storage plant of the general type now familiar in this country, a technical commission having recently been appointed by the French Minister of War to examine into and report upon the subject. A prize competition for a suitable design of plant has been instituted, and four designs have already been handed in.

#### Mundy's New Eight Spool Bridge Constructing Engine.

These engines are self-propelling, and will reverse or run either way at a speed of about ten miles an hour. The gearing is complete, each spool or winch working independently of the other, and they are so provided with clutches and pawls that each one will operate a block and fall, or may be used as the engineer may desire, holding one spool or hoisting with another in perfect harmony. The shafts are heavy and made of steel. The Mundy engines were first used by Messrs. Bairds Bros., bridge constructing engineers, of Pittsburgh, Pa., who have now about twenty of them in use in different sections of the United States. Three of these machines were used in erecting the Poughkeepsie Bridge across the Hudson River; two in erecting the bridge at Omaha and Council Bluffs; two were used in erecting the B. & O. bridge over the Susquehanna River at Port Deposit; three in erecting the Whipple bridge over the Ohio River at Point Pleasant, W. Va.; four in erecting the Citizens' bridge across the Mississippi River at St. Louis, and the Union railroad bridge over the Ohio River at Hendersonville, Ky. This latter bridge is a triangular truss, and difficult to handle, but the 250 ft. spans were raised and placed in position in eighteen hours. The channel span of this bridge is 522 ft. between centres, and was



Mundy's New, 8-Spool Contractor's Engine.

safely raised and placed in position in a very short time.

These engines are used by others of the best bridge builders and erecting engineers in the United States. Further information may be had of the inventor and builder, J. S. Mundy, 22 Prospect street, Newark, N. J.

#### Bridges at New York.

When all the bridges over the Hudson and East rivers for which franchises are asked are built New York will be well supplied with railroad communications. There are now three bills before the State Legislature for the incorporation of bridge companies which propose to span the East River and one before the United States Senate to authorize the New York & New Jersey Bridge Company to construct and maintain a bridge across the Hudson River.

Of the three before the State Legislature, that of the Manhattan & Long Island Bridge Co. is the most ambitious. First it is proposed to cross the East River at Blackwell's Island or a little below, the location being somewhere between Forty-first street and Ninety-second street in New York, and Fifth street and Flushing avenue in Long Island City. The exact position is to be decided by a commissioner appointed by the Mayor of New York, acting with one appointed by the Mayor of Long Island City and the directors of the bridge company. This bridge is intended to be used for the same purposes as the present Brooklyn Bridge, and it is not considered to be available for general railroad purposes.

The company also proposes to build another, or rather a series of bridges, connecting Long Island City with New York and the main land. It is to start from Long Island City, opposite the lower end of Ward's Island, cross the East River to that island, run thence by viaduct along the southern and western shore of the island to its northern extremity, cross Little Hell Gate to Randall's Island, continue along the whole western shore of the latter, and finally cross the Harlem Kill to Morrisania. In addition to this main line structure, there are to be connecting bridges over the Harlem River from

Ward's Island to or near 106th street, and from Randall's Island to or near 125th street, New York.

This northern system of bridges will be comparatively cheap to build on account of the short spans required, the longest being about 650 ft. between pier lines. The span between Long Island City and Ward's Island will have to be a high level bridge, probably cantilever, but the other spans over the Harlem River and Kills will be low grade bridges, with draw spans like those of existing bridges over the Harlem. This system is intended to serve foot passengers and ordinary vehicles and, at the same time, to accommodate heavy railroad traffic.

The bill provides that the capital stock of the company shall be \$1,000,000, in shares of \$100 each, to be increased to \$15,000,000 on the vote of the Board of Directors, as authorized by the majority of the stockholders.

The Blackwell's Island Bridge is to be commenced within one year from the passage of the act and is to be completed within four years thereafter. The Ward's Island Bridge is to be commenced within two years from the passage of the act and completed within five years. There is a provision exempting the property of the company, except real estate, from taxation for a period of five years after the completion of the bridge, and prohibiting the construction of any other bridge within 5,000 ft. of the structures for 25 years. The promoters of this scheme are headed by Mr. Zenas King, of Cleveland, O.

Another East River bridge scheme is practically a time extension to be granted to the New York & Long Island Bridge Co. for the construction of the Blackwell's Island bridge, and as such comes into direct conflict with the provisions asked for by the Manhattan & Long Island Co. This charter was first granted in 1867; it lapsed, and was renewed in 1871, likewise in 1879, 1885, and now another attempt is being made to give it another lease of life.

The McCarren bill, otherwise known as the Elevated

Railroad bill, is to incorporate the East River Bridge Co., of which George Hoadly, Adolph Ladenburg and others are promoters. This company proposes to build a bridge from some point at or near Broadway, in the city of Brooklyn, across the East River, to a point between Delancey and Rivington streets in New York. There is to be an approach to the bridge near Cannon street, New York, and thence extending westwardly through private property across the Bowery to Spring street, the directors having the right to extend the approach westwardly toward the Hudson River. This is to be a high level bridge, with a clearance of at least 135 ft. above high water in the middle of the East River, and is intended to unite the elevated railroad systems of New York and Brooklyn.

The bill also authorizes the construction of a second bridge starting from a point between Little and Bridge streets in Brooklyn, across the East River to some point between Jackson and Scammel streets in New York with approaches extending to a point between Delancey and Rivington streets, where a junction is to be made with the first bridge. In all of these bills there are the usual provisions for the condemnation of property and the limitations of head room above the streets and elevated railroads as they now exist. Both bridges are to be commenced within one year from the passage of the act and to be completed within six years thereafter.

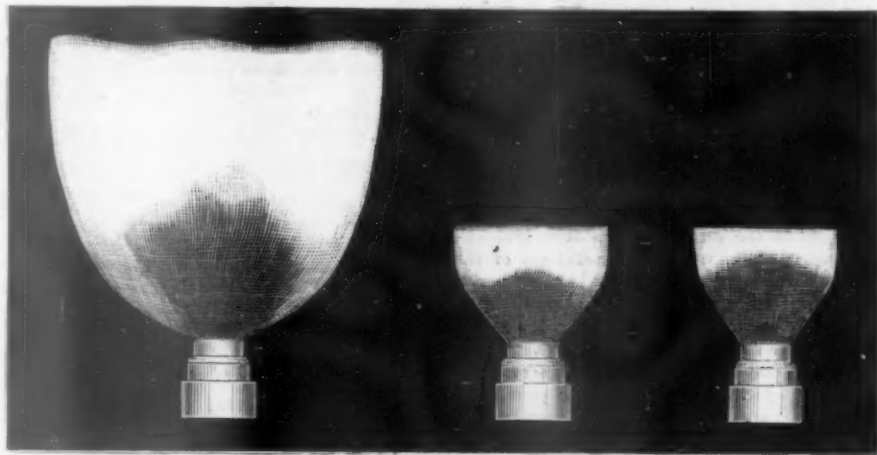
In Congress the bill authorizing the New York & New Jersey Bridge Co. to build a bridge across the Hudson River has but little chance of becoming a law, as the Senate Committee on Commerce has voted against it unanimously. This is intended to be a railroad and general traffic bridge. Mr. Hiscock has introduced into the Senate a bill providing that any bridge hereafter erected across the Hudson or East rivers at the city of New York shall be constructed with a single span over the entire river between existing pier-head lines on either side and at an elevation above ordinary high water of at least 140 ft. at the pier-head lines and 150 ft. at the middle of the stream.



**Illuminating Power of Pintsch Gas.**

A striking illustration of the high illuminating power of Pintsch gas over ordinary gas is shown at the New York office of the Safety Car Heating & Lighting Co. A number of their lamps, such as are used in railroad passenger cars, are suspended from the ceiling and connected with the receiver containing the compressed Pintsch gas from their works. One of the lamps is so connected that the supply of ordinary city gas, which is first seen burning, can be changed to the Pintsch gas by means of a three-way cock.

The Pintsch gas, as shown coming through the burners of this lamp, gives four times the illumination of the city gas under the same pressure through the same burners and consuming the same amount of gas per hour. The Pintsch gas, in order to be carried for railroad use, is compressed to about 10 atmospheres. As it is well known, gas by compression loses in its illuminating power. Now, were the ordinary city gas, which is first observed, compressed to the same number of atmospheres as the Pintsch gas, its illumination would be reduced 40 per cent., so that it can be plainly seen that if the city gas was compressed to the same pressure as the Pintsch, the illumination of the latter would be not four, but six times greater than the ordinary city gas. The Pintsch gas is the highest illuminating gas known to



Comparative Illuminating Power of Pintsch Gas.

the art. The accompanying cut illustrates the comparative power of the Pintsch gas and the ordinary city gas before and after compression.

**TECHNICAL.****Manufacturing and Business.**

Byram & Co., of Detroit, Mich., manufacturers of the Colliu cupola furnace, report the receipt of orders recently from three extremes of the United States, Greenville, Tex., Waltham, Mass. and Wallace, Idaho.

A. & F. Brown & Co., large manufacturers of pulleys, hangers and shafting, have recently removed their New York office from 44 Park Place to 17 Dey St.

Coolbaugh & Pomeroy, of 45 Broadway, New York City, have been appointed general railroad agents of the Lukens Iron & Steel Co., of Coatesville, Pa., for the sale of steel plates for locomotive fireboxes. This firm began the manufacture of boiler plates in 1810, when it made the first boiler plate made in America. Steel plates have been manufactured for 12 years and the company now has its own steel plant and a steel plate mill with an annual capacity of 50,000 tons, fitted to roll plates up to 116 in. wide.

The Whitaker Railway Tie & Timber Co., with a capital stock of \$50,000, has been incorporated at Texarkana, Tex., by W. L. and Benjamin Whitaker, W. N. Bemis, and H. E. Bemis, of Jefferson, Texas.

The Chester Pipe & Tube Co., of South Chester, Pa., has placed the contract for a new building with the Berlin Iron Bridge Co., of East Berlin, Conn. The building will be 52 ft. in width by 170 ft. long and constructed entirely of iron, no wood work being used about the construction.

Mr. W. B. Parsons and Mr. H. de B. Parsons, consulting engineers, have moved their offices from 35 Broadway to 22 William street, New York (Farmers' Loan & Trust Building). Their practice covers general, civil and mechanical engineering.

The St. Paul and Minneapolis Street Railroad Company contemplates another electric line between St. Paul and Minneapolis, passing Lake Como, the state fair grounds, St. Anthony Park, and other suburban points. In order to accomplish this, a connecting link will be built between the existing lines in both cities.

The Harris Forge & Rolling Mill Co., of Irondale, Ramsey County, Minn., has been incorporated by Abraham Harris, Marks Harris, Abraham Goldman and Alfred D. Arundel, the capital stock being \$400,000. The company is now constructing an extensive plant at Irondale.

**Car Heating.**

The Safety Car Heating & Lighting Co. has received the following orders for heating equipment: 25 sets for Wagner cars, 50 for the Erie, 20 for the Central of New Jersey.

**Electricity on the Northern Pacific.**

The Northern Pacific people continue their investigations into electric traction. It is said that a number of engineers from the Northern Pacific and the Wisconsin Central have gone to Boston to study electrical science at the Institute of Technology. This is by direction of the Northern Pacific management.

**Interlocking.**

Officers of the Wabash, the Jacksonville Southeastern and the Cleveland, Cincinnati, Chicago & St. Louis met the Illinois Railroad and Warehouse Commission recently with regard to interlocking the crossings of their roads at and near Litchfield, Ill. It was agreed to signal and interlock these crossings, the apportionment of cost to be made later.

**An Austrian Canal.**

A report favorable to the construction of a large canal between the Danube and the Oder has just been sent in to the Austrian Ministry of Commerce by the special commission appointed to investigate the subject. The main object is to create a cheap waterway between Vienna and Oderberg, where it would join the German

**Rapid Transit in Chicago.**

The Rapid Transit Commission appointed by the City Council of Chicago has reported in favor of elevated terminals for all steam roads, the exclusion of all horse cars from the heart of the city, and the repeal of the ordinance forbidding more than three cars in a cable train. Some of the other plans proposed are quite radical, but in the main the report is a good one, and if followed will relieve the crowded condition of the cars and streets during the morning and evening hours.

**Chicago Water Supply.**

The new water tunnel for North Chicago has been completed, and was put into service last week. Now a large portion of the city will have pure water from a part of the lake that is not contaminated by sewage. This tunnel is 7 ft. in diameter, and has a capacity of 100 million gallons daily.

**Stock Car Patent Suit.**

An action has been brought by the Live Stock Car Equipment Co. against Eastmans' Co., of New York, and an injunction asked for restraining the defendants from using cars provided interiorly with racks for holding hay from which cattle may eat when in transit and at the same time be free to move about in the car. It is claimed that the cars now used by the defendants for the transportation of cattle from Chicago to New York are an infringement of the patent No. 288,677 granted Dec. 5, 1882, and which is the property of the Live Stock Car Equipment Co. Upon the result of this action depends the right to use cars of the pattern now in common use all over the United States.

**Locomotive Boiler Explosion.**

Last Monday the boiler of shifting engine No. 180 of the Reading exploded in the yard of the Reading car shops, above Nicetown station, near Philadelphia, killing one man and two boys and severely injuring five others.

**Elevated Terminals in Chicago.**

The Mayor of Chicago has prepared a proposed ordinance to compel the railroads entering the city to elevate their tracks. He will also propose to the wholesale merchants to establish a system of warehouses on the outskirts of the city to be connected by a belt line road so that goods can be easily stored until sold without blocking the traffic in the heart of the city.

**Coupler Legislation.**

In the *Evening Post* of Feb. 4 appears a letter from Col. H. S. Haines, Vice-President of the Plant System and President of the American Railway Association, referring to the statement made by the New York *Tribune* that "there is no good reason to believe that the railroads will soon provide an adequate remedy of their own volition." The remedy spoken of is against accidents to employees resulting from the use of non-automatic couplers. Colonel Haines reviewed briefly the action of the Master Car Builders' Association which, after great expenditure of money and considerable time, resulted in the adoption of the M. C. B. type. Then, as actual trial gradually developed practical couplers of this type, and eliminated the more or less crude devices, the American Railway Association took the matter up and adopted as standard the M. C. B. coupler. The result of the action of these associations has been that over 300,000 cars have been equipped with a coupler of this type, and most of those now under construction and contract will be so equipped. This shows the statement of the *Tribune* to be incorrect, as the railroads are providing "an adequate remedy of their own volition." It is pointed out further that the expenditure for equipping the present freight rolling stock with the M. C. B. coupler will be about \$25,000,000, and as the margin between present rates and cost of service is so small such expenditure must be provided for from capital account, and many companies must wait until they can sell securities to provide the means. In the meantime companies that can provide the money for the change will go on and gradually force their connections to take the same measures. It is pointed out that compulsory legislation is rather a hindrance than a help. A sales agent of the coupler companies recently told Colonel Haines that he found great difficulty in making sales because of the apprehension among railroad managers that through State or Congressional legislation some other type of coupler might be made compulsory. "The interest of railroad experts and managers in this subject is sufficiently intense to assure to others equally interested that the so-called automatic freight car coupler will be brought into general use as rapidly as it is practicable without the aid of compulsory legislation."

**Magnesium Light.**

An ingenious magnesium light for general lighting purposes is described in French journals. The light is designed to burn for 24 hours consecutively with a constant intensity, and its first cost is said to be moderate. The hourly consumption of magnesium is placed at 40 grammes, which, at a cost of 50 francs per kilogram, would put the expense at 2 francs per hour. With a further reduction in the price of magnesium, promised by the later metallurgical advances, the light should find extended application. The light supplied by 1 kilogramme of magnesium is stated to be equal to that obtainable from 130 kilogrammes of candles, or about 230 cubic metres (about 9,100 cu. ft.) of ordinary illuminating gas.

canal system. The mouth of the proposed canal is to be at Vienna, and it is to take its course through lower Austria to Oderberg, running into the Oder.

**One Dock Contract.**

The contract for building the new ore dock for the Duluth & Iron Range railroad, at Two Harbors, Minn., has been let to T. H. Mathews, of St. Paul.

**Electric Consolidation.**

Within the past week an agreement has been reached between the Thomson-Houston Electric Co. and the Edison General Electric Co., looking to the complete union of the two corporations. The terms of this agreement have been printed in full in the daily press. They only require, for confirmation, the assent of a majority of the stockholders of both companies before May 1, 1892. The committee appointed to complete the work of consolidation is as follows: J. Pierpont Morgan, D. O. Mills, H. McK. Twombly, Frederick L. Ames, T. Jefferson Coolidge and Henry L. Higginson.

These gentlemen are empowered to form a new corporation or reorganize any existing corporation, so as to provide for the substantial accomplishment of the purposes of the agreement. This will involve the surrender of stock of the present companies in exchange for stock in the new company on the following basis: Shares of Edison stock shall be exchanged in full payment for shares of the new stock, share for share. Shares of preferred stock, Thomson-Houston, shall be exchanged for shares of preferred stock in the new company at the rate of four shares of old stock (par value \$25 each) for one share of the new (par value \$100 each). Shares of Thomson-Houston common stock shall be exchanged in full payment for common stock in the new company at the rate of five shares of old stock for three of new.

The new corporation is to have a capital stock of \$50,000,000 in 500,000 shares of \$100 each of which not more than 20 per cent. may be preferred stock entitled to receive dividends of seven per cent. per annum cumulative, but without preference as to principal.

The feeling with regard to this combination of the two most prominent electrical companies seems to be that while it may reduce the expenses of management and canvassing and lower the prices of materials for a time, it cannot affect permanently the general condition of the market nor greatly injure the interests of the many smaller concerns which are at work throughout the country. This view seems the more reasonable when we consider the rapid advances which are being made in all departments of electrical work and that some of the most approved devices of to-day may be out of the race a year hence.



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## EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in his journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

As we go to press the news comes that the Central of New Jersey and the Lehigh Valley have passed under the control of the Reading, which agrees to pay dividends up to 10 per cent. on the Lehigh Valley and 7 per cent. on the Central. The consolidation will embrace about 2,800 miles of main line, on which the gross earnings in 1890 were nearly 51 millions. The coal carried by these systems in that year aggregated 27,387,043 gross tons. In the same year the Pennsylvania carried 20,158,877 tons of coal and coke, the Erie 9,587,982 tons, the Delaware & Hudson, 4,915,376 tons, and the Delaware, Lackawanna & Western 6,566,463 tons. So the consolidation will be considerably the largest coal carrier in the country. Of course the news of such an arrangement sets afloat a hundred rumors of vast combinations among the coal producers and carriers, but probably these may be safely disregarded; it is doubtful if there is much more in the consolidation than appears on its face. But that is enough. The consolidated system will control ample terminals at tidewater, notably at Port Richmond, on the Arthur Kill and in New York harbor; included in these is the recent and important work of the Lehigh Valley south of the Jersey Central's passenger terminal. The Reading's recent acquisition of the Poughkeepsie Bridge will be an element in the control of the New England market. It will be noticed that the agreement calls for a pretty high rate of interest. On the Lehigh stock it is to be 5 per cent. per annum till next July, 6 per cent. the next year and then 7 per cent. The surplus above 7 per cent. is to be divided between the Reading and the Lehigh Valley until dividends on the latter's stock reach 10 per cent. On the Central stock 7 per cent. is to be paid. In the last three years the dividends paid by these companies have been: Lehigh Valley, 5 per cent. per annum; Central, 3 per cent., 6 per cent. and 6½ per cent.

The rapid transit discussion is still at fever heat in Boston, but in New York everybody is keeping quiet waiting for the development of the next step, which is the appointment by the Supreme Court of a commission to determine whether the Rapid Transit Commissioners' plan is such as ought to be constructed and operated. Application will be made to the Supreme Court for the appointment of these three commissioners, on Feb. 18, or as soon after as counsel can be heard. This commission, when appointed, must make its report within sixty days, unless the court extends the time. Meanwhile there is not likely to be much interest in new projects. One was presented, however, in the New York Sun of last Sunday, which has some good features, or at any rate good suggestions. It is for a four-track road, to be built over the tracks of the New York Central from the

Harlem River to the Grand Central Station, thence turning to the east and going down to City Hall, between Second and Third avenues, on private property. The portion above the Grand Central Station would be carried on a metal structure directly over the tunnel, and at such a height as to clear the street crossings. This would have the incidental advantage of removing the roof of the tunnel except at the street crossings. It is proposed to carry the line from about the Grand Central Station southward, through the blocks, on a masonry viaduct about 45 ft. high, making three-story warehouses below. The structure would be for four tracks all of the way. Such a scheme has many obvious strong points. It would be unnecessary, however, to carry it up to the height of 45 ft., and it would be undesirable to do so, for the reason that it would necessitate elevators at all stations. This is something to be avoided if possible, on account of the additional first cost and the constant burden on operating expenses forever after. Moreover it would be a mistake to stop the line at City Hall. A very great part of the travel to be accommodated is to and from the district between the City Hall and the Battery, and with the constant growth of big office buildings in that district this part of the traffic becomes more and more important. Nor would it be wise to put the line between Second and Third avenues.

## The Results of the Recent Brake Tests at Burlington.

In another column will be found the records of last week's tests of the New York and Westinghouse brakes at Burlington, except the diagrams obtained in the dynamometer car; those will be given next week. These results are important, as they corroborate in general those gathered on the same track in 1886, 1877 and 1888, and testify to the value and usefulness of the large number of compressed air brakes put into service on freight cars since that time. Probably the most gratifying as well as the most remarkable features of these last tests are those connected with the tests made of a 50-car train that had been in constant service for two years and without cleaning for the past three months. These cars were taken from service and tested without alteration or repairs and without adjustment of the piston travel, yet it appears from the records of the tests that the action of these brakes was fully as good as that of the new ones taken from stock. Therefore we must conclude that the quick-acting, automatic, compressed air brake generally used in this country is a serviceable and durable device.

One reason for the certainty of action of the air brake, in emergency stops more particularly, is that the device automatically reveals any defect in the emergency feature and generally cannot be used at all unless this part of the brake is in good order. To some extent this is also true of the graduation feature, but not generally so except while the cars are being let down a heavy grade at a uniform speed. At such times a leak in the graduating mechanism makes itself felt by a rapid increase of the braking power which checks the train more than is intended by the engineer, and the freedom with which the brakes can be controlled to keep a uniform speed down the grade is reduced.

Tests to determine the action of the brakes on a down grade were not made owing to the limited time, but enough was learned from the graduation tests made to indicate what this action would be. The action under the other conditions of freight service was well determined, and the conclusions were sufficiently convincing to enable the officers of the road to decide on the brake equipment of the large number of cars now under construction.

Before describing the scope of the tests and discussing the results, there is one important conclusion which may be best stated here. It is that anyone seeing the old cars and brakes in action at Burlington last week would be convinced of the falsity of the oft-repeated excuse, "the brakes failed to work." It is not too much to say that whenever the engineer has kept up the train pipe pressure and the trainmen have opened the train pipe cocks throughout the train, there can be no danger that the air brake mechanism will not work. If the mechanism is faulty the weaknesses are made evident by a failure to release. If the mechanism is not safe for emergency work the shoes will stick to the wheels and prevent the train from starting.

Last week's tests were made to determine the following features of action under freight service conditions:

(a) Quickness of commencement of application on last car of a 50-car train.

(b) Rapidity of full application on last car of a 50-car train.

(c) Distance run before stopping, after brakes are applied.

(d) Shocks produced in rear car at 20, 30 and 40 miles per hour.

(e) Time elapsing between movement of engineer's handle on locomotive and the shock in rear car.

(f) Pressure in cylinders at the instant the shock occurs in the rear car.

(g) Graduation test to determine if brakes would hold a partially constant pressure in the cylinder for grade work.

(h) Release test to see if brake shoes would come off the wheels readily and quickly so as to prevent delays in handling freight in long trains, where brakes have to be pumped off, and the excess pressure used for releasing does not reach through the entire length of the train, or for some other reason is not available.

(i) Single car test to determine if the triple valves would give the emergency action when the air is rapidly discharged through the service application port of the engineer's valve.

The following are the general results of the different tests with the two types of brakes used:

For the sake of brevity the following letters will represent the various brakes in the data which we have given.

N. Y. No. 2 = New York Brake, No. 2 triple.

W. H. S. = Westinghouse brake, with new triple from stock with heavy graduation springs.

W. L. S. = Westinghouse brake, with new triple from stock with light springs.

W. O. T. = Westinghouse brake, with old triple in use two years, heavy springs.

TEST (a).		
N. Y. No. 2	.....	3 seconds about.
W. L. S.	.....	3 " "
W. H. S.	.....	3 15 " "
W. O. T.	.....	3 15 " "

TEST (b).		
N. Y. No. 2	50 lbs. in 4 15 seconds.	70 lbs. in train pipe.
W. L. S.	50 " 4 " "	70 " " " "
W. H. S.	50 " 4 " "	70 " " " "
W. O. T.	55 " 4 " "	86 " " " "

The last for W. O. T. is equivalent to 58 lbs. in 4 seconds for 70 lbs. in train pipe.

TEST (c).  
The actual results are not fairly comparable for accurate conclusions owing to the difference in condition. The rails were "good" for one set of tests and "bad" for another; and, in fact, for the test of the second brake they were very bad; for the third brake they were somewhat better, and for the fourth they were fairly comparable with the first. Further, it must be borne in mind that the brake shoe slack was cumulative from the first to the last test, and was taken up on no car during the tests, unless the piston travel became greater than 10 inches. In this connection it should be observed that in the last test at least the train pipe and auxiliary reservoir pressure was not as great as the conditions of the tests called for. Thus, different piston pressures, and consequently different braking forces, were obtained in different tests, further complicating comparison of stops.

It should be stated here, however, that it was generally considered by those present at the test that the rapidity of the attainment of full pressure in the rear car is a better indication of the power of the brakes to make a short stop than the actual distance run, owing to the great uncertainty respecting the equality of conditions. The equated stops show that in some cases the train having the "bad" rail made a shorter stop than another on a good rail, which may be accounted for, perhaps, by the fact that the train broke in two parts in one case and not in the other, and no allowance was made for the distance which the two parts of the train separated. In fact, so much is now known about brakes and braking that it may be safely concluded that of two brakes under equal conditions the one which first has the maximum pressure in the cylinder on the rear car will make the shorter stop. And the same may be said with regard to the shock produced.

TEST (d).		
15 to 25 miles per hour.		
N. Y. No. 2	.....	6.8 inches, average.
W. L. S.	.....	.05 " "
W. H. S.	.....	.35 " "
W. O. T.	.....	.35 " "
30 to 35 miles per hour.		
N. Y. No. 2	.....	3.4 inches.
W. L. S.	.....	.2 inches.
W. H. S.	.....	.4 " average.
W. O. T.	.....	.3 " "
36 miles per hour.		
N. Y. No. 2	.....	No shock.
W. L. S.	.....	.05 inches.
W. H. S.	.....	No test at this speed.
W. O. T.	.....	" " "

The negative shocks or those of recoil are not considered, neither those in the front car, as they were all produced by breaking in two as far as could be determined. It is not yet clear how they result, if they do, from a difference in the quickness of the action of brakes, which is the point now under consideration.



## TEST (e).

N. Y. No. 2.....	5.5 seconds.
W. L. S.....	6.4 "
W. H. S.....	6 "
W. O. T.....	6.2 "

Probably the quicker application of full pressure in the cylinders in the case of the last three brakes mentioned above delayed the time of shock and decreased its force; the time averaged about 0.7 second later, and the shocks were much less. Seven-tenths of a second corresponds to about 20 ft. traveled, at 20 miles per hour, which is about the speed when the greater shocks were recorded. In these tests, as in those of '86 and '87, the greater shocks were produced at the lower speeds, owing, probably, to the greater friction of the brake shoes at those speeds, causing a greater retardation of the front of the train before the brake applied in the rear.

## TEST (f).

With all the brakes tested, the pressure at the time of the shock was practically that of full equalization or maximum pressure. In making this record, there was much error owing to the surge which preceded the shock being mistaken for the real shock.

## TEST (g).

Except for the observation in the case of the N. Y. No. 2 brake that the pressure gradually increased in the cylinders after the first application, there was no material difference in the action of the various brakes. In such tests in the future it would be well to increase the period between the reductions of pressure on the engine, in order that it may more fully correspond with the conditions on down grades, where the brakes are held on for a considerable period, and further to determine how much importance should be attached to the observed fact that in one case the pressure in the cylinders continued to rise. However, this can only be fairly done by securing also luteally tight leather piston packing in the cylinders, such as would not be generally the case where the brakes had been in use for two years, as they had been in the case in point.

## TEST (h).

N. Y. No. 2.—8 released in 90 seconds and 16 "stuck on" and were released by brakeman after a period of 7 minutes.	
W. L. S. All released in 65 seconds. Time varied from 13 to 65 seconds.	
W. H. S. Not tested.	
W. O. T. All released in 82 seconds. Time varied from 10 to 82 seconds.	

This was the most important test made. The New York brake in this test acted not unlike one of the early forms of the Westinghouse brake, which had an uncertain release, and was abandoned for that reason. Such a brake was used at Burlington in 1887. It had a slide valve which admitted air to the brake cylinder from the train-pipe during an emergency stop, the slide valve being pushed off its seat by the triple valve piston and returned again by a spring. In that valve the spring failed at times to return the slide valve, and when an attempt was made to release the brakes the air for releasing passed into the brake cylinder and caused the brakes to be set harder instead of releasing.

So in the case of the New York valve the spring under the emergency valve failed to return those valves to their seat and the brakes would not release but went on harder than before. This was a severe test, but one which would almost certainly occur after an emergency stop with a long train. Probably if the train pipe pressure had been raised fast enough, the brakes would mostly have released, but the object was not to make the test under favorable conditions, but instead under unfavorable ones, so that the real merit of the brake for all conditions of service could be determined. Some complaint was made of the unfairness of this test, but all agreed after discussion that it represented service conditions, and therefore was just to all concerned. However, to be exactly just to the New York brake, it should be stated that its makers said that the triples were hurriedly constructed and that the leakage by the triple pistons and their resistance to motion were too great, and that better workmanship would remove the trouble. Of course a positive release is essential to a good brake, and, granting hurried workmanship, one must also consider that valves corrode and work hard and stiff after being in service, and if a spring is depended upon to obtain release it must be stiff enough to overcome all resistance after service. This is a complicated subject to those who are not familiar with the details of triple valves, and need not be discussed further here.

## TEST (i).

In this test the action of the triples was different mainly in the emergency action when the service application port of the engineer's valve was left wide open. Under this condition the New York No. 2 had an emergency action in one case and not in another, and the Westinghouse light spring had none. This test was not especially significant other than to show that with only

one or two cars in a train the emergency action might be obtained when it was not wanted, but this is not a material difference. As there would be no excuse for opening the service port wide and holding it open when there were only two cars in a train, and if the emergency action was obtained it would probably in such a case do no harm.

So far, then, as the tests go considerable valuable information was obtained. We all know more now about testing brakes and where there are liable to be difficulties and what to look for. The value of a graduation test was shown the week previous to these tests, during an examination made of a new brake at Indianapolis. In that case the tests revealed that the brake would not graduate and for many reasons it would be a dangerous one to use.

Outside of brake efficiency itself, there was much learned at Burlington last week about the effect of emergency braking on a 50-car train. One will notice from the column of "remarks" in the account of the tests that the train broke in two parts in seven out of the 17 stops. The breaking of the link between the dynamometer car and the tender was due undoubtedly to the lack of braking power on the locomotive. The shoes on the drivers and tender wheels were new and had not become fitted to the wheels. The levers and connections were good. In the other cases the drawbars or the attachments failed. There were three cases of broken drawheads or knuckles and three cases of broken draft rigging. It was clearly evident that although the draft gear was unusually strong, and of a new type, yet when attached to the wooden sills it was not strong enough for quick stops with long trains. It would, however, be more accurate to say that the draft gear itself was not broken, but the sills to which it was attached, being of wood, could not hold together against the heavy strains, hence they spread and allowed the gear to be pulled out. The knuckle and drawheads broken were of sound material, and were not defective in that respect. They lacked the necessary strength to withstand the severe pull. When air brakes are generally used there will be no danger of trains being damaged seriously by breaking in two parts, but there will be many delays if stronger couplings and better draft sills are not provided.

## Some American and English Railroad Statistics.

The statistical report of the Inter-state Commerce Commission commands wide attention abroad, as it ought to, being a somewhat complete exhibit of the operations of much the greatest mileage of railroads ever collected into one body of statistics (always excepting, of course, Poor's "Manual"). It is beginning to come back to us, with more or less comment, in the European journals. A recent issue of the *Glasgow Herald* contains an article in which some of the figures of this report are used in comparing certain conditions and results of railroad operation in the two countries.

The first comparison is the well known one of capital per mile, viz., \$90,340 in the United States and \$216,844 in the United Kingdom. This comparison by itself is interesting and even striking, but it is terribly overworked. It is made a basis for all sorts of arguments by men who have all sorts of theories, to prove. In fact the two things are not comparable in this particular. The cost per mile represents something in our country that it does not represent in the other. In our last issue we spoke of the one item of parliamentary costs in the United Kingdom. This is about \$10,000 per mile of road actually built. But, although it is apparently a heavy load on the capitalization of the roads it is not by any means an unmixed evil. It has prevented the waste of much greater sums in unnecessary lines; and of two proposed lines it has often prevented the building of the one with the more costly or less useful location. Again, the right of way has been immensely more costly in an old and finished country than across the vast, unoccupied regions through which much of the mileage of the railroads of the United States was built. But there are several other items of cost which act directly to save cost of operation or to increase the capacity of the lines operated, or both, and which result in absolute or relative economy. Among these are over and under crossings, fixed signals and interlocking, stations in towns near the centres of traffic, with unobstructed approaches and expensive fixed machinery for handling freight, and, finally, more rolling stock, sidings, shops and stations per mile to handle the denser traffic. So we conclude that, while the Englishmen have paid more for a mile of railroad than we have, they have bought something very different from what we have.

The *Herald* takes the Commission's report of the number of locomotives in passenger service, divides the passenger-miles by that number, multiplies the

quotient by the rate per passenger-mile, and arrives at £6,387 (\$80,977) as the annual earnings for each passenger locomotive in the United States. By a similar process £9,305 (\$45,130) is found to be the average annual earnings of a freight locomotive. The earnings per locomotive in the United Kingdom are found, by dividing the total earnings by the number of engines in service, to have been £4,714. On the London & North-western each locomotive earned £4,370; on the Caledonian £4,541 and on the North British £4,758. This is a bad showing for the British locomotive, but before we let the eagle scream let us look further. We find that the *Herald* statistician has neglected 4,062 switching and 1,342 "unclassified" locomotives, or over 14 per cent. of all in service. Taking the total earnings and all the locomotives, that is using the same method that was used to get the average earnings of the locomotives of the United Kingdom, we find the average for the United States to have been £7,230 (\$35,062). This is still a good enough figure for comparison and is fairer.

But here again, as in the case of the cost per mile, we are comparing things that are unlike, and the figures are a good deal more curious than useful. It is a bold deduction that these greater earnings per locomotive are due to the use of cars with "bogie" trucks, which is the only explanation that the *Herald* writer offers of our better results. In comparing earnings per engine we must take into account the fact that the average American locomotive weighs more, runs more miles a year, hauls bigger loads, hauls them further, burns more coal, evaporates more water, and, in general, does more work, partly because it is capable of doing more and partly because the conditions are different.

Several other comparisons are made and that the reader may see for himself what they are we reprint on another page the essential parts of the article; but we warn him that the figures of earnings and expenses per ton per mile on the English railroads are probably assumed. At least we do not know that these figures have ever been officially published; if they have been it is very lately. Mr. Acworth guesses that the average English rate is 1½d. per ton per mile and Mr. Dorsey, in 1885, arrived at the same figure. Very likely it is close to the truth, and safe to reason from. But we suggest to the Scotch student of railroad statistics, first, that our railroads are able to struggle along with an average rate per ton-mile of 0.94 cent, not solely because they use long "bogie waggons," and, second, that with all their skill in economical operation the average return on all the capital invested in the railroads is but 3.03 per cent. per annum.

We regret to be obliged to chronicle what seems to be an indisputable fact, that the main cause of the recent locomotive boiler explosions appears to be a neglect on the part of the owners of the locomotives to properly inspect the condition of the boilers and keep the repairs up to a point where the engine ceases to be dangerous to run. As an example, we have three recent cases where boilers exploded because the staybolts were both broken and corroded off to such an extent that even a thick-witted mechanic could have told that an explosion was likely to happen if he had tapped the sheet with a hammer. Hasty people may reason from these explosions that staybolts are dangerous, but it would be as logical to reason that car wheels are dangerous devices because they will cause a derailment if a big piece of the flange is broken off. A staybolt is a reliable device, but like all other reliable devices about railroad equipment on which the safety of human life depends they need watching. No device in the mechanics' art is infallible; yet it may be reliable, and is reliable to just the extent to which it is watched and inspected. An unreliable mechanism is one which has the possibility of a hidden defect which inspection will not show, but such the screw staybolt is not. If it is broken an inspection will reveal the defect, and if it is drilled with a telltale hole or is made of hollow iron a break will be automatically revealed by the escaping steam. So then all these explosions which occur from defective staybolts come under the head of criminal carelessness, and in one of the recent cases the coroners' jury, which usually gets mechanical matter wrong side up, fixed the blame where it belonged, viz., on the railroad company owning the engine. But we would go a step farther and fix the direct responsibility upon the master mechanic having charge of the engine which exploded, as we do not believe that the general officers of any road, however much they may desire to keep down the expenses, would countenance or permit a neglect of boiler repairs or inspection where human life is endangered, if they were aware of the facts. The blame, therefore, rests with the master mechanic who fails to notify both the officers of the road, and the engineer and fireman on the engine when a boiler is in a dangerous condition. To return to the staybolt question, we wish to impress upon the public that the frequency of locomotive boiler explosions does not signify that there is anything wrong in the use

of staybolts, and that all such boilers are dangerous, that the designs are wrong, the pressure too high, the sheet too thin or that there is any mystery about boiler explosions generally. The whole cause lies in carelessness either on the part of the men who run the engines or the master mechanic who has charge of them, and we regret to say that in a majority of the most recent explosions the master mechanic or the officer of the road in direct charge of the locomotive equipment appears to be the guilty person.

The attempt to make a time table which will exactly supply all the wants of the passenger while not bewildering him with a perplexing mass of material that he does not want, is one that is being more and more carefully pursued by the more enterprising passenger agents and one which is still neglected by a great many. Neglected, we mean, in the sense that some very plain wants are not met, while yet money is spent for many less valuable features. Perhaps the most noticeable improvement during the past few years in pocket table-folders is the use of better paper and more artistic printing. A folder recently issued by the Burlington—which, by the way, does not show the full name of the road anywhere upon it—embodies not only the good features we have mentioned, but has the novelty of a map, and schedules of the two through trains between Chicago and Denver, each way, so arranged that each station in the schedule is exactly on a line with the station on the map. Moreover, the map is not merely a straight line, but is as good as most small scale maps, like the best of those in the *Official Guide*. It is slightly distorted, but still affords a practically correct guide to connections for one who has taken a Burlington train. About all railroad maps are open to the objection that they are partial to their makers, but this folder is more for the convenience of passengers after they have selected their route, so that this criticism does not apply. The a. m. and p. m., the connections, meals, through cars, etc., are so fully explained that there are no stars, daggers or other instruments of torture of any sort attached to the figures, and the wayfarer, though he be one of the usual kind, will find his excuse for asking questions rapidly failing him. A city ticket agent of the road says this folder and one other, Chicago and St. Paul, save him hours of time; a strong statement, but not without a good deal of reasonable basis. The St. Paul line is not so nearly straight as that to Denver, but the plan, nevertheless, seems to work well with it. Mr. Anthony, the head of the advertising department of the Burlington, has applied for a patent on the device. The Burlington has also just issued a pamphlet, "One Hundred Questions Answered," descriptive of the country between Chicago and Denver, and arranged for use especially on Train No. 1. A similar book issued by the company a few years ago was written or edited by a poet, if we mistake not, but this is superior to that, we think. It deserves as much praise as the patented map, and is refreshingly honest. For instance, "the country, as the plains are approached, is very uninteresting. For 120 miles the stations are little more than sidings or water tanks." What other G. P. A. will show a little of that kind of courage?

Strange to say, they have been having a grain blockade in Russia, at the same time with the famine. A German journal says that the present distress there seems largely due to inability to transport grain from one part of that country to another. While considerable districts had very poor crops, others had a fair and some even a large production of grain. On the Vladikaukaz Railroad, to the northeast of the Black Sea, all stations were overflowing with grain, most of it exposed to the weather. On a line extending 80 miles, the grain which had been bought by town authorities alone amounted to about 1,500,000 bushels, and the deliveries by private shippers had been so great that for more than a month no new deliveries could be forwarded; among the Cossacks of the Don and the Ruban in the southwest and others in the southwest, in the last half of October, 10,000,000 bushels of grain were in store at stations and could not be forwarded, and there was much more to come. The railroad officers assert that the blockade was largely due to municipalities which ordered nearly a whole year's supply of grain to be delivered at once. The grain could not be handled as fast as it arrived at the station to which it was shipped, which in many cases is distant from the town where it is to be consumed, and it would be rotting there while not a car could be had to supply the immediate wants of another community whose order was received later. It must be remembered that, while an immense district in Russia produces a large surplus of grain, another immense territory usually produces barely enough for its own consumption, and this territory naturally is ill provided with railroads, because it affords very little for transportation, and it is much more difficult to send the surplus grain of the South to these interior communities than it is to export it, though the distances to foreign markets are much greater. The Russian Government conferred with the railroad companies and adopted a series of measures which were intended to make the best use possible of all facilities at hand, but these measures not proving effective, the government sent one of its railroad officers to South Russia, with full powers to order whatever should seem necessary, without regard

to any previous regulations, to forward the grain as fast as possible.

Our criticism of the methods of preventing collisions that were set forth by a New York coroner's jury has been copied by the San Francisco *Call*, which, noting the fact that we criticize editors for setting up as experts in train running, goes on to defend the jury's theory. We hardly expected our argument to be convincing among those who had not studied the subject, for it really required, for proper statement, very much more space than we could give it; but as the *Call* is temperate and reasonable, we will answer its main point and that is the financial argument, based on the plea that railroads are "enormously rich," and therefore can afford to maintain a telegraph system that will communicate from anywhere to everywhere at any moment. Our critic should note two things: First, that so far as the rich road immediately under discussion was concerned, we explicitly recommended the block system, and that that system as now being put in on that road is more costly than the plan which the coroner's jury thought would be suitable. So that the dissipation of the enormous riches of the railroad company is not a factor in the question. Second, the discussion was as to methods in running trains without the block system. Granted that the block system was the only remedy for rear collisions, the discussion was, indeed, a "back number;" but in view of the strong probability that many thousand miles of road would still continue to be operated under the old plan—the time-interval system—it seemed desirable to treat the question as a live one; to emphasize the fact that the railroad managers, with their experience, still knew best how to work out the details of train running. With all their faults we felt sure that they still were far ahead of the jurymen and the editors in that business. And in view of the censure visited on the train dispatcher, the rights of the matter demanded setting forth whether the plan itself deserved approval or disapproval.

Telegraphic advices from Chicago and St. Louis show the present situation in respect to the grain blockade to be about as follows: At Chicago the western roads are taking care of all local shipments without delay and are able to deliver all export grain as fast as received. The eastern lines are able to take care of the export grain at that gateway without great delay, but this is apparently owing more to the fact that the movement via Chicago just now is lighter than a month ago than because they are able to handle very much more now than then. The large shipments via St. Louis consigned to Baltimore have the effect of temporarily easing the Chicago terminals. There is also a moderate movement to New Orleans, but this will be but temporary, owing to the limited terminal facilities at that port and the fact that it is only for a short time that the weather will permit of the safe loading of cargoes there. At St. Louis there is a decided blockade, owing to the inability of the Baltimore & Ohio and Ohio & Mississippi to take care of the Baltimore grain. It is stated that their sidings are practically filled with loaded cars from Baltimore to East St. Louis, and that the Missouri Pacific is also congested as far back as Omaha with loaded cars.

A contemporary has contradicted a statement made in the *Railroad Gazette* to the effect that the cable roads in Chicago are crowded practically to the limit of their capacity. If what was said is not true there must be some other good reasons why the cables so frequently break and why there are so many delays to street traffic in that city. Why is it that month after month the same delays are experienced and with no remedy, and why do not the officers of the roads in their reports and recommendations for better rapid transit explain the causes of the delays? There is a noticeable abundance of recommendations that the city grant better franchises and facilities to the cable companies, but it is not clear how increased accommodations would affect the breakage of the cables, the grips and other apparatus which are the direct causes of the delays now so annoying. One Chicago street railroad manager has just declined to run more cars on the State street loop, giving as a reason that the cable will not stand the additional strain. This in itself is an acknowledgment of the truth of what we have said about the point to which cables are worked in Chicago.

A facing point switch accident on the Chicago & Alton on Sunday of this week calls attention again to the frequency and danger of accidents of that class and to the easy means of preventing most of them. A passenger train, southbound, ran into a siding that had been left open; it is said to have been running at about 45 miles an hour. A stock train was standing on the siding and a butting collision occurred. The two locomotives were badly wrecked, two firemen and one engineman were killed and the engineman and baggageman of the passenger train were injured. Of course everybody knows now how practicable and how cheap it is to protect facing point switches by distant signals to be worked by interlocked levers.

The Vaucain compound ten-wheel express locomotive built for the Master Mechanics' Association Committee, is being tried on the Pennsylvania lines west of Pitts-

burgh. From the reports of the engineers on the road it appears that this engine is now making schedule time with 13 cars, and that it hauls in one train all the cars that were formerly run in two sections, and easily makes time with trains that have previously had two locomotives, as double headers. It is reported that, besides the manifest saving in wages of enginemen and firemen, there is a decided saving in fuel. After the tests on the Pennsylvania it is reported that the locomotive is to go to Chicago, to be run on the Burlington and the St. Paul roads.

The Pennsylvania system will soon have some 10-wheelers in passenger service on its Western lines. Designs have been prepared by the mechanical department at Altoona and by Mr. F. D. Casanave, Superintendent Motive Power Northwest System. The engines will be built at the Fort Wayne shops. The designs are of modern type, having 68-in. drivers, 19 x 24-in. cylinders and 62-in. boilers, and they will weigh about 120,000 lbs. This type will be known as the class "X."

#### NEW PUBLICATIONS.

*Technology Quarterly*. October, 1891. Massachusetts Institute of Technology, Boston.

The articles of special interest in this issue are a description of the triple expansion experimental engine in the engineering laboratories of the Institute, and a paper on the application of Hirn's Analysis to Multiple Expansion Engines. Both of these are by Mr. C. H. Peabody, and the latter was presented at the Providence meeting of the American Society of Mechanical Engineers. The experimental engine described was built by the E. P. Allis Co., and is of the Corliss type. The cylinders are 9 in., 16 in. and 24 in. diameter respectively, with 30-in. stroke. The engine furnishes power for electric lighting of the building and for such tests as require power.

*The Ventilation of Buildings*. By Alfred R. Wolff, M. E., 315 Potter Building, New York City. Pamphlet, 32 pages. Price, 25 cents.

This is a compact and quite thorough theoretical discussion of the general principles which underlie the proper ventilation of buildings. No details are given of special methods or of actual features of construction.

#### TECHNICAL.

##### The Old Colony Compound.

We are informed that the Old Colony compound has now run 14 weeks without losing a trip. We have as yet no specific report of performance.

##### Paper Conduits for Electric Wires.

That paper conduits for electric wires for use in the interior of buildings are not known in this country alone is shown by a recent article in the *Revue Industrielle*, of Paris, in which the varied uses of such tubes and their method of manufacture are detailed at some length. Concerning the latter, some of the particulars there given may be of interest.

The paper from which the tubes are made is supplied in the form of thick rolls, which are first cut up into comparatively narrow sections by circular saws. From these sections the paper is rolled spirally on mandrels, revolving at speeds of from 50 to 500 turns per minute, according to the diameter of the conduit to be made. Successive layers of the paper are wound upon these mandrels in reverse directions, so that there is a general breaking of joints. After each layer has been wound, the partially formed tube, with its mandrel, is passed through suitable compressing rolls in which the density and durability of the paper is increased. When the desired thickness of paper has been reached, the tube is slipped over an iron mandrel, and placed in a drying chamber in which a temperature of about 100 degrees C. is maintained, and where all traces of moisture are removed. Then, while still hot, the tube is submerged in a bath of secret composition, heated to 80 degrees C. by steam coils, and is left there for a period depending upon the thickness of the paper walls of the tube. After removal from this bath, and further drying, the tube is ready for use.

##### The Purdue Laboratory.

Purdue University, of Lafayette, Ind., has fitted up a laboratory for experimental work in steam engineering, applied mechanics and hydraulics. In several respects the equipment of this laboratory presents some novel ideas. The most noticeable and unusual feature is the locomotive, which is an eight-wheel passenger engine, weighing 85,000 pounds, complete in every detail, and capable of doing regular road service. To the wheels any desired load can be applied by friction brakes of special design and of sufficient capacity to absorb the entire power of the engine. The engine can be fired in the usual manner with coal, or connection can be made with the laboratory steam plant. The laboratory also contains a 100 H. P. triple expansion steam engine, built especially for experimental purposes. The connections are such that any of the cylinders can be worked singly or may be worked in combination under any one of six possible arrangements, thus giving for the purposes of the laboratory what is equivalent to nine differ-



ent engines. The equipment of the laboratory also includes a gas engine, several kinds of pumps, turbines, water-wheels and motors, and a large amount of apparatus and appliances for testing and experimental work in steam and hydraulic engineering.

#### Steel and Iron Making at the Head of Lake Superior.

The first heat at the mill of the Superior Iron & Steel Co. was drawn on the 27th ult. This is the first steel produced in the Lake Superior region. On the 2d inst. the first steel plate rolled on Lake Superior was turned out and, loaded on a dory, headed a procession of citizens to the ship yard, where it was bent into proper shape and riveted into whaleback No. 123, now in the course of construction. Coke iron is also produced there from Gogebic and Vermilion ores, and coke from the cokery plant of the Lehigh Coal Co. at West Superior. The coal was brought from Lake Erie ports as return freight. The people at the head of Lake Superior seem inclined to cultivate a home market for ores, as it is stated they offer to furnish smelting furnaces with ore at \$2 per ton. This ought to make cheap iron, as the coal is brought up generally for 50 cents or less per ton.

#### Model of a Sleeping Car.

The general public has been made pretty familiar with the fact that the Chicago, Milwaukee & St. Paul built for the German government some models of postal cars; at least the statement of this fact has appeared in the daily papers at frequent intervals for a good many weeks past. We have recently received a photograph of a model of a vestibuled compartment sleeping car made within the last year by Mr. A. B. Macklin, formerly Canadian Passenger Agent of the Chicago & Alton. This model is built to a scale of one twelfth, and it is said that the details are complete within and without. It is wired for incandescent lighting. The exterior is very handsome, and it strikes one as being an attractive thing to put in the window of a city ticket office.

#### New Stations and Shops.

The Atlantic Coast Line will erect large machine shops at Rocky Mount, N. C.

Plans have been prepared by C. C. Taylor, of Cincinnati, O., for the erection of a stone station at Port Payne, Ala., for the Alabama Great Southern Railway Company, to cost \$42,000.

The Houston Central Arkansas & Northern will soon let a contract for the erection of a roundhouse at Alexandria, La.

The Baltimore Belt Line and the Baltimore & Ohio, have, it is thought, decided upon the location for the union station in Baltimore. A block of ground 180 by 300 ft. has been purchased at the corner of Lombard Street and Gillingham alley which it is thought is to be used for that purpose. The block purchased is well located for a new station.

The Norfolk & Western has begun the erection of an addition to its shops at Bluefield, W. Va. The addition will be quite extensive, and it is reported that the entire plant when completed will represent an outlay of \$250,000.

#### The Breaking of the Beam Pool.

The Beam Association has for a long time succeeded in keeping prices up to an artificial level, but at last it is broken. Jan. 30 the firm of Carnegie, Phipps & Co. declined to accept the conditions proposed by other members of the Association and it is broken up. An attempt was made to reduce the price to 2.8 cents for beams and 2.5 cents for channels, but the Carnegie people with their new Homestead mill are in a position to roll beams cheaper, probably, than anybody else in the country, and it is supposed that they are now prepared to go to war. What the price will go to, of course, cannot be predicted. There were 11 firms in the Association and 4 outside, and many of these are strong enough to make a hard fight. It is the opinion of the *Iron Age* that 2 cents a pound at the mill is below the cost of production for some of the works, but that the best equipped mills can turn out large quantities of heavy sizes at this price.

#### A Burst Petroleum Tank.

The *Zeitschrift* of the Austrian Engineers' and Architects' Society, in a recent issue, gives a number of illustrations, with particulars, of a ruptured petroleum tank which was erected near Vienna a short time ago. The similarity of the accident to a number of such mishaps which have been recorded within the past few years in connection with water-works stand-pipes in this country gives it a special interest. The tank was one of a pair, each designed to hold 1,500,000 litres, and was completed in November of last year, mild Bessemer steel being the material employed. In order to test the tanks for leakage and other defects, they were filled with water, and while calking up a sweating rivet in one of the tanks, rupture occurred in one of the lower courses of sheets, completely wrecking the tank and seriously damaging the other one, which was only a short distance from it. From what has thus been made known it would appear that structural defects and extreme hardness of the material combined brought about the accident.

#### THE SCRAP HEAP.

##### Notes.

A San Francisco paper states that the Southern Pacific is to adopt the Standard Code of Train Rules.

The United States Grand Jury at Springfield, Ill., is investigating charges of the violation of the Interstate Commerce Law against the Grand Trunk and others.

An Indiana grand jury has found an indictment against the Wabash for violation of the state law requiring railroad companies to provide suitable waiting rooms at towns of 250 people or more.

The Michigan Central has taken up the operation of its own dining cars. These have been run by the Wagner Company for seven years. Mr. W. H. Lindley, of Detroit, has been made superintendent of the dining service.

The Houston & Texas Central is delivering daily to the International and Great Northern about 50 carloads of granite for the Galveston jetties, and the San Antonio & Aransas Pass is delivering about 15 cars of stone a day for the same work.

The Mercer County, Penn., Grand Jury has presented indictments against Robert Riley and Louis W. Leonard, conductor and engineer of the construction train which caused a wreck at Pennington, Dec. 3. Three lives were lost in this wreck. Riley and Leonard were released on \$3,000 bail.

The old exposition building, which has so long been a matter of controversy in Chicago, is at last being removed to make room for an \$800,000 art building. The old building was an obstruction to the development of the Lake Front Park and was unsafe in a heavy wind. The new building will be used for conventions during the World's Fair.

A passenger train of the Southern Pacific was turned on to a siding, Feb. 4, by a switch having been opened by tramps. Five of these men were put off a freight train by the train crew. They then went to Baden station and opened a switch, permitting a northbound passenger train to run into freight cars standing on the siding. Fortunately no one was hurt, but the locomotive and express car were considerably damaged.

#### Foreign Notes.

The Egyptian government has decided to invite an English, a French and a German engineer to study the projects for the drainage of the city of Cairo. Their stay will be six weeks, and their remuneration \$2000. It has also been determined by the government to undertake promptly the construction of a railroad to Luxor in continuation of the line now being made between Assiut and Girgeh.

The contract for the railroad bridge over the Lan Ho River, North China, has been let to Messrs. Handyside & Co., Derby, England. The bridge has 5 spans of 200 ft. each and 10 of 100 ft. It was competed for by English, German and American firms.

The famine in India continues. In Madras the outlook is becoming worse and worse. The government is starting more relief works wherever necessary and famine kitchens have been opened. In Ajmere and Merwara the situation is aggravated by the fact that the failure of rains last year followed a succession of bad seasons. There 20,000 or 30,000 people are employed on relief works, and it is expected that the number will be doubled in the next few months.

Paris is complaining of a "smoke nuisance," serious protests having lately been made in all quarters of the city against the pollution of the atmosphere by the various local manufacturing establishments. The municipal authorities have voted for an appropriation of 2,000 francs to be expended in examining into the subject and suggesting suitable remedies if deemed necessary.

Kathite, according to the *Revue Industrielle*, is the name given to a new caoutchouc preparation brought out abroad. It is made up of vulcanized caoutchouc and finely divided silk fibre, and is claimed to combine a high degree of elasticity with great resistance and durability.

Beginning with April 1, 1892, a number of the several German state railroads, among them those of Baden, Bavaria and Württemberg, and the Ludwigs railroad will be run on uniform standard time as determined upon at a meeting at Dresden last year. It is expected that the roads will be joined in this movement by the government roads in Alsace-Lorraine, and that this beginning will exert an important influence on the adoption of a uniform time throughout Germany.

Speaking of the kinds of fuel used in Russian industries the *Industrie-Zeitung*, of Riga, points to the somewhat remarkable circumstance that at Moscow by far the largest proportion of the fuel burned is wood, notwithstanding its appreciably higher cost over other available fuel for the same heating power. More recently, however, there has been a growing tendency to substitute for it naphtha residuum, and statistics for the year 1890 show that of wood, naphtha and anthracite coal there were used, in that year, the following proportions: Wood, 53 per cent.; naphtha, 33 per cent.; anthracite, 14 per cent. One-third of Moscow's industries thus use naphtha residuum as a fuel, and its employment is said to be steadily on the increase, while the consumption of anthracite coal is actually diminishing.

According to the *Revue Industrielle*, M. Arrol has devised an electric alarm for railroad use, designed to warn workmen engaged in track repairs and other work along a line of the approach of a train. The apparatus consists essentially of a powerful electric bell, with its accompanying battery and from 300 to 400 metres of wire. One end of the wire is fastened to one of the rails near the workmen, and the other, by means of a long, flat spring, with ebonite fixture, is attached to a rail as far off as possible. Under these conditions the electric circuit is open, and the alarm, consequently, at rest. On the passage of a train or locomotive, however, over the spring, the latter is pressed down against the rail, the circuit is closed and the alarm sounded, thus giving the men ample time to seek safety.

During the last three years the average annual receipts of the Egyptian railroads were about \$6,035,000. The increase in mileage of the roads has not been great, but there has been an appreciable increase in the number of passengers carried. Thus in the year 1890 about one million more passengers were carried than in 1889, and in the latter year the total number reached about three and one-half millions. In 1889 the first and second class passenger rates were raised about 10 per cent., though in the year preceding a reduction of 25 per cent. had been made in single trip and excursion fares. A

reduction of the comparatively high passenger rates is now recommended, and will probably be effected in the near future. At present, the upper Egyptian line is being extended from Assiut to Girgeh, a distance of 78 miles, and will probably, later on, be continued to Luxor.

#### World's Fair Notes.

Both the Philadelphia & Reading and the Pennsylvania will have elaborate exhibits at the World's Fair. That of the Reading will be in charge of General Agent Kindred. The coal display will show the manner of handling coal from mine to market. The display will include the rolling stock and reproductions of road-bed.

California will send two elegantly furnished railroad coaches made from a single butt of a large tree. The tree will be felled so as not to splinter it, and will then be sawed to a proper length for passenger coaches. The interior will be cut out, and doors and windows made to complete a serviceable passenger car.

#### Railroads and Politics.

The general manager of the Grand Trunk (Canada) has issued a circular to his employees asking that they shall not take any active part in Parliamentary elections.

#### The Brooklyn Bridge.

The bridge trustees have decided to pay the widow of the late Col. W. H. Paine, \$5,000 as compensation for the claims of her husband against the bridge in connection with the cable grip and other inventions in use on the structure. It is decided to extend the block system on the bridge. The expense will be about \$3,000.

#### Stealing Air Brake Parts.

Special officers of the Pennsylvania Railroad have been investigating complaints of thefts of air brake parts from freight cars in Pittsburgh. Directors have caught two boys in the act.

#### South African Railroads.

An official notice has been published of the opening of the New Cape Government railroads. The main trunk line from the Colonial seaports to the Transvaal will be opened for general traffic to Kronstad in Orange Free State, Feb. 20. An additional length of line will be opened by the end of April.

#### Railroads in Japan.

The Japanese Government has submitted a bill for constructing new railroad lines, purchase of private lines and issuing of railroad bonds. It is proposed to build about 700 or 800 miles of new line.

#### Promoting Religion Too Fast.

A Georgia paper states that the general practice of carrying preachers at two cents a mile has revealed to the roads of that State the fact that they run through the greatest missionary field in the world. About one-half the colored population have become exhorters, to teach the truth to the other half. It is proposed to limit the reduced rate tickets to specific fields so as to keep better track of the ministers, but it is feared that the revenue from colored passengers will show a large falling off, as there will be a great increase of staying at home.

#### Spanish American Notes.

The great engineering work of opening and maintaining a channel at the Torres from the ocean into the Lagoa dos Patos in the state of Rio Grande do Sul, Brazil, is being pushed forward under direction of a German engineer Rheingantz. Work was inaugurated Oct. 24, with great pomp and ceremony. When completed it will admit the largest ocean ships to the lake, and afford communication with Porto Alegre, the metropolis of that region. As we understand the work it involves cutting a channel through a narrow sand spit having an old reef as a back-bone, and the subsequent maintenance of a free waterway by scour from the outflow of the lake. The flow of several rivers whose waters are controlled so as to empty into the narrow part of the lake opposite the Torres is depended upon to secure a sufficient current for the scouring action.

The Empresa das Obras Publicas do Brazil has paid up to the present time \$655,000 toward the purchase of the Amazon Steam Navigation Co., which looks as if it meant to own the line. This steamboat company practically monopolizes transportation in the Valley of the Amazon, having a fleet of over 30 boats, and maintaining a monthly service between Eari and all the important tributaries of the Amazon, as far as Yurimaguas, Peru, 3,000 miles from the mouth of the river.

The congress of Paraguay has approved the concession, so far as it relates to Paraguayan territory, for a railroad from Asuncion to the Brazilian port of Santos. The Brazilian congress had previously granted a concession for this line to the Visconde d'Obert. The road as projected will pass through the city of Curitiba, state of Paraná, and will have a length of 1,000 miles.

Mr. R. B. Pealer has received permission from the Republic of Uruguay to build a railroad from Montevideo parallel with the coast to the Arroya Carrasco, thence to a point on the North Eastern of Uruguay Railroad.

The northern extension of the Central Northern Argentine Railway, from Jujuy toward the Bolivian frontier, which was recently condemned by the Government engineers, is now being repaired by the contractors, Messrs. Lucas, Gonzalez & Co., under the inspection of Señor Rosetti, of the Board of Public Works. Several engineers and employees of the railroad, connected with the scandal, have been dismissed by order of the Government.

The Transandine Railway Co. has been fined by the Argentine Government for opening a section of its line between Uspallata and the Rio Blanco without permission of the Railroad Board.

Complaints from Rosario, Argentina, as to the obstruction of that port have been so great that the government has ordered the Martin Garcia channel to be dredged at once. Rosario, lying farther up the Rio de la Plata than Buenos Ayres, and several hundred miles nearer the most important centres of production in Argentina as well as being nearer Bolivia and the valley of the Paraguay, would become the great shipping port of that region, were its harbor improved so as to afford ample anchorage and wharfage for ocean and river craft.

Telegrams from Chili during the past week announce that the government intends floating a loan in Europe to the amount of \$25,000,000, for the purpose of building a number of new war ships, and for building a strategic railroad from Santiago to Iquique. Like many South American dispatches, this important statement will not bear analysis. Both the ships and the railroad cannot



be built with the money. The distance between these two cities is something over 1,000 miles, and the cost of the railroads in Chili has averaged about \$54,000 a mile. There are both political and commercial reasons for an Iquique-Santiago line, just as there was a similar call for trunk lines in Argentina. It is certain, however, that this road and several war ships will not be built for \$25,000,000, and we furthermore doubt whether Chili could at present raise that amount of money in Europe. For her sake we should regret to see her incurring the load of debt which has proved so disastrous to her sister republics.

The Bolivian government has appropriated \$5,000 toward the expenses of a survey for a railroad from Cochabamba to one of the Amazonian tributaries in the plateau of Mojos in the northeastern part of the Republic.

Mr. W. F. Shunk's division of the surveying party making a reconnaissance for a Pan-American Railroad, which recently reached Bogotá, Colombia, reports the difficulty of railroad construction southward into Ecuador as being far less than has hitherto been supposed. This is saying much, as it has always been feared that the passage of the mountains between Popayán and Ibarra would prove almost impossible.

The Santa Marta Railroad, intended to connect that Colombian port with the Rio Magdalena, is already proving of great value, having led to largely increased shipments of cacao and bananas from Santa Marta. It is considered one of the most promising of Colombian enterprises.

English engineers have surveyed the uncompleted portion of the Girardot Railroad, intended to connect the City of Bogotá with the Rio Magdalena above the cataract south of Honda, and have reported favorably as regards cost of construction and prospective remunerativeness. This question will come up before the next Colombian Congress.

Work on the new pier at Puerto Colombia, the new seaport five miles west of Sabanilla, Colombia, is half finished. The pier when completed will be 4,000 ft. in length, and will receive alongside ships of any draft. It is built of iron and steel, with double track its entire length. Puerto Colombia is connected by rail with Barranquilla, the great river port on the Rio Magdalena.

#### A Western Idyl.

Among the incidents of life in Missouri are lynching parties, with their victims, on passenger trains. The following is the substance of one of this week's press dispatches: The Missouri Pacific train, which carried the Lamar lynching party, with Kepler, the murderer, from Nevada to Lamar, Mo., last night, was boarded soon after the lynchers took possession by two masked men, who robbed the express car. The robbers then boarded a north-bound freight, and when stopped by a colored policeman at Fort Scott one of them shot and killed him. The robbers got into an empty box car of an outgoing freight, but were overtaken at Pleasanton by the officers in pursuit. An exciting battle ensued, when one of the robbers was killed and the other was wounded.

#### Railroad Legislation in New York.

A good many railroad bills have been brought before the committees of the New York Legislature at this session. Four of them are State Commission bills. One of these would prevent the incorporation of a new railroad until a certificate that public convenience and necessity require the construction of the railroad has been filed with the Commission. Another provides for the separation of grades at highway crossings, the charges for effecting the separation and for maintenance to be apportioned by a commission. Another one regulates the loading and transportation of dynamite or other explosive substances. It is provided that such explosives shall not be carried on any steamboat or train carrying passengers, or upon any freight train unless in original packages distinctly marked. If carried on working trains any vacant space in the package must be filled with sawdust.

Aside from the Commission bills there is one to prevent a railroad charging more than legal fare, there is a grade crossing bill, there are bills to regulate the hours of labor, and there is one regulating the minimum train crews that may be carried. An automatic coupler bill has been introduced in the state Senate.

#### More Rainmaking.

Some one has taken the trouble to point out, in connection with the recent rainmaking experiments in India, that the explosion of 11 tons of dynamite, at Matounga a few days ago, did not produce a single drop of rain.—*Indian Engineering.*

#### Clergymen's Tickets.

Rev. A. Samuels is now in the county jail at Chicago for selling to a broker a half-fare ticket of the Rock Island. He had several clergymen's permits, which he was trying to sell when he was arrested.

#### Western Waterways.

A delegation from the Western Waterways Convention, held at Evansville, Ind., last October, appeared before the United States House Committee on Rivers and Harbors on the 5th. Their mission was to urge appropriations for the improvement of Western rivers. There were various speakers, each of whom explained the needs of the special region which he represented. Among these, Captain L. R. Keck, of Cincinnati, spoke of the Ohio as the most important river in the country, and yet he says it gets less from Congress in proportion to its value than any other waterway. He says there is need of appropriations for more dredge boats and snag boats and for funds to keep these in service whenever they are needed.

#### Labor Troubles.

The Union Pacific grievance committees have received a reply to their demands from the General Manager, who says that the company will not entertain a proposition for a general advance in wages, as it is now paying its employees as well as any road in the country. It is stated that the switchmen in Omaha have united to demand the removal of a yardmaster.

Employees of the Denver & Rio Grande, through a grievance committee, are attempting to secure an equalization of wages through the different departments of the road. This seems to apply to operators, conductors and brakemen.

#### LOCOMOTIVE BUILDING.

The Schenectady Locomotive Works have received a contract for eight engines for the Chicago & Eastern Illinois.

The Louisville & Nashville order, noted last week, was awarded to the Cooke Locomotive Works. It included 25 engines, nearly all consolidation.

The St. Louis & San Francisco has ordered from the Baldwin Locomotive Works 12 19 x 24 cylinder mogul freight locomotives with 58 in. radial stay, wagon-top boilers, weight in working order about 100,000 lbs.

The Baldwin Locomotive Works have shipped 19 compound locomotives since Jan. 1. Among other orders for compound locomotives received since Jan. 1 are: One 10-wheel passenger engine for the Rio Grande Western; five 10-wheel passenger engines for the Norfolk & Western; one noiseless switching engine for the Wilmington street railroad of Wilmington, N. C., and six locomotives, of which four are passenger and two are consolidation freight engines, for the Caste de Minas Railway of Brazil. This is the second order of compound engines for the last named company, two trial engines having been shipped them early last year.

#### CAR BUILDING.

The Long Island road is reported in the market for 300 cars.

The Cleveland & Canton has let contracts for 1,000 cars to Pennock Bros., of Minerva, O.

The Baltimore & Ohio will probably place an order in a few days for 1,000 freight cars, 350 to be coal and 650 lumber cars.

The Cleveland, Cincinnati, Chicago & St. Louis has contracted with the Barney & Smith Mfg. Co. of Toledo for 1,000 cars.

The contract for 1,250 freight cars for the Central of New Jersey was awarded to the Lehigh Valley Car Works, Stenton, Pa.

The New York, Susquehanna & Western order for 200 or 300 cars referred to some weeks ago will probably be given out next week.

The Butters Lumber Co., which has its office at Hub, N. C., is buying considerable equipment for a logging road being built from that town.

The New York, Lake Erie & Western has let a contract for 50 passenger cars to the Wason Car Mfg. Co., of Brightwood, Mass., for delivery in March and April.

The Canadian Pacific is building four colonists' sleeping cars, in which several changes from the usual standard have been made, and it is said that all the colonists' sleeping cars hereafter built will be similar to the new type. The cars will be vestibuled, and there will be fixtures between the berths, to divide them more effectually. Strong leather covered seats will be provided in place of the old wooden seats.

#### BRIDGE BUILDING.

Alvinston, Ont.—Engineers of the Grand Trunk are surveying the site for the bridge over the Sydenham River and the work of building the bridges will probably commence at once.

Cumberland, Md.—The iron work for the new bridge over Will's Creek, near Cumberland, Md., arrived last Thursday from the Keystone Bridge Works. The masonry of the new bridge is ready for the superstructure, although there is considerable stone work yet to be done. The Baltimore & Ohio Railroad will build a stone viaduct over the Chesapeake & Ohio Canal, at Cumberland, Md. Work has been begun on the structure.

Fairmont, W. Va.—The stone work for the new bridge over the Monongahela River, building for the Fairmont Development Co., has been completed, but a considerable delay has been caused by the inability of the Canton Bridge Co. to get the superstructure on the ground and erected. It is promised that the work will be ready to erect in 60 days.

Hancock, Md.—The new bridge over the Potomac River at Hancock, Md., building and owned by a joint stock company, is now completed and will be opened for use next week.

Minneapolis, Minn.—The contract for erecting the iron highway bridge across the tracks of the Minneapolis & St. Louis at Third street has been let to the Philadelphia Bridge Works. The structure has a double approach with a driveway, to the freight house below grade, between the approaches. Width of driveway, 35 ft.; and two sidewalks each 8 ft. wide; length of iron work, to point of junction with portion of bridge to be built by the Great Northern, 230 ft. Keeper & Riser, of Clinton, Ia., will erect the work which will be built after the plans of C. F. Loweth, C. E., St. Paul.

Monongah, W. Va.—Work has been commenced and is being pushed rapidly forward on the new steel bridge over the Monongahela River, at Monongah. The stone work is well under way and the bridge will probably be ready for use in about 60 days.

New York City.—Bids will be received by the Department of Public Parks, New York, for the construction of the drawbridge over the Harlem River at Seventh Avenue, together with its eastern approaches. The bridge is to be 412 ft. long and 64 ft. between railings. The approaches will consist of 16 spans of lattice girders and of 480 ft. embankment between retaining wall. Each of the spans is composed of 6 lattice girders 23 ft. between centres and resting on stone piers. The principal estimated quantities are as follows: 2,444,000 lbs. of iron for draw; 750,000 lbs. turn table; 5,417,000 lbs. approach spans; 7,400 cu. yds. dredging; 3,870 cu. yds. pneumatic caisson work; 7,500 cu. yds. excavation; 13,300 cu. yds. masonry; 2,675 cu. yds. retaining wall; 8,500 cu. yds. fillings. Plans and specifications are on file at the Department of Public Parks and at the office of the consulting engineer, Mr. A. P. Boller, 71 Broadway, New York.

Parkersburg, W. Va.—The piers and abutments of the Ann Street bridge over the Little Kanawha River, at Parkersburg, W. Va., have been completed, and the work of erecting the false work preparatory to putting up the superstructure has begun.

St. Boniface, Man.—The Town Council of St. Boniface, Manitoba, and a local land improvement company will build another bridge across Red River and have the electric car service extended to St. Boniface.

St. John, N. B.—The Canadian Pacific Railroad Company is reported to have offered to pay one-half the cost of the new railroad bridge at St. John, N. B. The estimate for a heavy freight and passenger bridge is about \$500,000, including land damages.

#### RAILROAD LAW—NOTES OF DECISIONS.

##### Powers, Liabilities and Regulation of Railroads.

In New Jersey it is held by the Court of Chancery that a railroad by condemning a right to cross the track of another company acquires the right to cross at grade, subject to the limitations that it shall not cross at a less angle than 20 degrees, and that it shall not cross in such a manner as will destroy the reasonably fair enjoyment of the franchises of the company whose route is crossed.<sup>1</sup>

In Iowa while a railroad was in the hands of a receiver appointed by a federal court, a decree was entered in the state Supreme Court compelling the company, "its successors, assigns, grantees and lessees," to operate a certain part of the line. Afterwards the railroad was sold under foreclosure decree rendered in the federal court, and the purchaser conveyed to a corporation, which conveyed to defendant. Upon an application for an order against defendant to show cause why it should not obey the decree of the state court, it admitted the above facts, but denied that it was the successor or assign of the company against which the decree was rendered. The Supreme Court holds that defendant was such successor, and that the decree should be enforced against it. And also that the fact that defendant has leased that part of the road required to be operated by the decree to another line, and that, if compelled to operate it, the rental, amounting to \$14,000 a year, will be lost to defendant, is no ground for defendant's disregarding the decree.<sup>2</sup>

In Nebraska the Supreme Court decides that under the constitution which enumerates the officers who shall compose the executive department of the State, and which provides (section 29) that "no other executive state office shall be continued or created," the legislature has no power to create a railroad commission, but it may designate existing executive state officers to act as such commissioners, with power of supervision over railroads.

The North Carolina statutes provide that where a railroad crosses a highway it must do so in a way not to impede public travel, and that the company must restore the crossing to such a state as not to unnecessarily impair its usefulness. The Supreme Court rules that the company may use plan in restoring a highway to a level with the railroad at one of its crossings.

In New Jersey the Court of Chancery decides that where a mortgage covers the entire plant of a railroad, embracing its real and personal estate and franchises, the court will assume, in the absence of evidence to the contrary, that the plant is an entirety, the elements of which are so essentially intermingled, and each so indispensable to the value of the other, that they cannot be separated without material injury to the value of each; and hence such property is within that section of the law (74) which authorizes the court to order a sale of all the property covered by a mortgage, though the whole mortgage debt may not be due, where the sale of a part of the property alone would result in material injury to the remainder.<sup>3</sup>

In the Supreme Court of the United States the F. & S. line, forming an integral portion of the line of a railroad company, was constructed under a contract by which the stock of the company, representing the F. & S. line, was delivered to the contractors in payment for their work. This stock was about to be attached by subcontractors, and in order to prevent it from passing to hostile parties, the railroad company gave its own notes to the subcontractors in payment of their claims. This stock was pledged for the payment of the notes, and on default of payment, when the stock was about to be sold, the Court, on petition of its Receiver theretofore appointed for the railroad company, directed the issue of receiver's certificates for the subcontractors' claims, on condition of the release of the pledged stock, which certificates were to be a first lien on the whole line. The first mortgage bondholders, by their trustees, were parties to this proceeding. Afterward, on foreclosure of the mortgages, these certificates were directed to be first paid out of the proceeds of sale. The Court decides that the bondholders, who had merely an equitable lien on the F. & S. line, having failed to appeal from this decree and having purchased the road under it, are estopped to deny the priority of the receiver's certificates.<sup>4</sup>

##### Injuries to Passengers, Employees and Strangers.

In New York the passenger who was injured while in charge of a carload of stock was riding on a ticket issued to drovers, and which contained a clause that, if the person in charge of the stock should leave the caboose and pass along the train or track, it was at his own risk of personal injury. The Supreme Court holds that this did not relieve defendant of its liability.<sup>5</sup>

The Supreme Court of Nebraska rules that the term "criminal negligence," as used in the law, c. 12, § 3, which renders railroad companies liable for all injuries to passengers, except such as arise from the "criminal negligence" of the passenger, or a violation by him of an express rule of the company, brought to his notice, means "gross negligence," or such negligence as would amount to a flagrant and reckless disregard of the passenger's own safety, and amount to a willful indifference to the injury liable to follow.<sup>6</sup>

In Pennsylvania, in an action for the death of a brakeman caused by a defective standard in a shunting apparatus claimed by plaintiffs to have jumped out of its socket while being used in shifting a car, it appeared from plaintiff's own witnesses that the standard, instead of jumping out, broke off in the socket, and that there was a downward bearing upon it, so that, even if loose, and without a pin to hold it in, it could not have bounced out. The Supreme Court holds that there was no evidence of negligence on defendant's part to go to the jury.<sup>7</sup>

In New York, in an action by an employé for injuries received by being struck with a dirt plow as it fell off one of the cars of a train from which earth and gravel was being removed by its use, there was no evidence that there was any known appliance better adapted for the purpose for which it was being used. Neither was there any evidence of any defect in its original construction or of failure to keep it in repair. The only evidence as to how the accident happened was that offered by defendant, that the plow as it was being pulled along the cars struck a large stone, which became wedged between two of the cars, whereby it was raised above guard-rail and then forced over by the pressure of the earth. The Supreme Court sets aside a verdict against the railroad.<sup>8</sup>

In Iowa a brakeman, seeing stones thrown from under a moving car, stood on a ladder on the side of the car and leaned down to ascertain the cause, and was struck and killed by a "wing fence" of a cattle guard placed 3 ft. 10 in. from the rails. Such an accident had never before occurred on the road. The Supreme Court rules that the company was not guilty of negligence in erecting the fences at that distance from the rails, as the accident



was not one likely to occur or reasonably to be apprehended.<sup>11</sup>

In Georgia the Supreme Court rules that a locomotive engineer is not entitled to assume in all cases that persons on a public crossing will get off in time to save themselves, but in running his train at a crossing in a city is bound to observe reasonable diligence, before he discovers peril as well as afterward, and the company is responsible for his negligent errors of judgment.<sup>12</sup>

In the same state the deceased was killed by a train at the north end of a trestle 150 yards long and from 12 to 15 ft. high. She and another woman had been to a water tank at the other end of the trestle, and were on their way back. They did not commence to run until the train had passed the water tank, where they thought it would stop. Deceased fell and her companion tried to help her up, but before she could do so she was hit by the train and thrown from the track and deceased was run over and killed. The train stopped with the front driving-wheels on her. The Supreme Court holds the railroad not liable.<sup>13</sup>

In Iowa the plaintiff was lawfully upon defendant's depot grounds, unloading corn into a crib which was near two highway crossings, when defendant's engine passed without signal, and frightened plaintiff's team, causing them to run away and injure plaintiff. A law provides that no railroad engine shall approach a highway crossing without giving a signal, and makes the neglect to give such signal a misdemeanor. The Supreme Court rules that defendant was liable, although plaintiff was not attempting to use such crossing.<sup>14</sup>

The Supreme Court of South Carolina holds that the failure on the part of a railroad train to give notice of its approach will not avail a party who knew of its approach without the giving of the signal.<sup>15</sup>

In Kentucky the deceased was employed by defendant in taking the numbers of cars on its side track in a town, and while in the discharge of his duty, and properly standing upon defendant's main track, he was struck by a section of a train which was switching, and there was no one on the cars in a position to give warning of their approach. The Supreme Court holds that the company was willfully negligent.<sup>16</sup>

In Colorado the Supreme Court holds that where in the absence of the superintendent of construction, the workmen employed in constructing a railroad are performing their labor under the supervision and direction of a general foreman who has full power and authority to employ and discharge them, such foreman is, in relation to such workmen, the representative of the railroad company, and not their fellow servant.<sup>17</sup>

In the Federal Court it is decided that where a railroad by rule forbids its brakemen going between freight cars to couple them, and provides that coupling must be done by means of a stick, the company is not liable for the death of a brakeman who, in consideration of employment by the company, signed a written recognition of such rule, waiving all liability of the company to him for any results of disobedience thereof, when it appears that he understood what he was signing, that the company had provided coupling sticks for the train, and that the death was the result of disobedience of the rule.<sup>18</sup>

In Michigan a man belonging to the switching team in the yards of defendant railroad, and who had been employed there about a month, was, in the performance of his duties, killed by being jammed between a freight car, up the side of which he was climbing, and a building situated in defendant's yard by a side track and which was only 13 to 16 in. distant from the side of the car while passing. The building, which was not as high as a freight car, was about 50 ft. from the switch which he had just turned to let the car in on the side track. As the car passed he got on it on the side toward the building for the purpose of setting the brake, but before he got on top he was caught between the car and the building. There was no evidence that he had ever switched a car on that side track, or, if he had, that he had not been on the other side of the car or on top, and there was no claim that he was ever informed of the danger. The Supreme Court holds the railroad liable.<sup>19</sup>

In Vermont the Supreme Court rules that a servant assumes all dangers arising from the known incompetency or unskillfulness of a fellow servant, which he does not complain of or make known to his master.<sup>20</sup>

In New York the plaintiff was engaged in loading a train of flat cars with cross-ties which lay along the track. Sometimes plaintiff was obliged to board the train while in motion. This was done by swinging up between two cars by placing one hand on the end of each car, there being no other way of boarding it. While plaintiff was thus attempting to board the train, his leg was caught and crushed between the drawheads of the two cars. The Supreme Court decides that plaintiff was negligent in putting his leg between the drawheads, and the question whether there were buffers to prevent the bodies of the cars from coming together was immaterial.<sup>21</sup>

In Iowa, the facts were that the track at the place of the accident was liable to be overflowed in heavy storms; that a heavy rain fell the night of the accident; that the ties at that point were unsound; that ice did float on to the track; that the engineer had been told to be careful at other places, but not at this place specially; that he was running with care, but that on account of a fog he could not see the ice till too late; that the section foreman had been along a few hours before, and saw that the water was rising; and that the derailment was partly due to the bad condition of the track, which let the rails spread. The Supreme Court holds the railroad liable for injuries resulting from the accident.<sup>22</sup>

In Wisconsin the Supreme Court rules that when a car is derailed by reason of the accumulation of snow, ice and dirt in the flange ways, the railroad company is liable to an employee on the car who sustained injuries by reason of the derailment, since the duty of keeping its track in proper repair rests on the master.<sup>23</sup>

In Georgia the plaintiff, a brakeman, testified that he went behind the engine to uncouple it; that it was standing still at the time, but afterward, without any signal from him, backed up and caused him to catch his hand between the bumpers; and that he would not have been hurt but for its unexpected movement. He knew it was an ordinary coupling, and that the dragbar, which they generally used, had been broken a day or two before, and did not think the engine and car could have come together if the dragbar had been in position. He further testified, on cross-examination, that to the best of his recollection he had uncoupled the link before he was hurt, and that in that case the cars would have come together even if the dragbar had been there. The Supreme Court holds that the evidence of the company's negligence was sufficient to go to the jury, and that it was error to grant a nonsuit.<sup>24</sup>

In the Federal Court it is held that freight conductors do not so far represent the company as to be authorized

to rescind rules made by the company for the guidance of its brakemen in coupling cars.<sup>25</sup>

In Iowa the Supreme Court decides that where plaintiff had been engaged by defendant for several years in attending to switch-lamps in its yard, and while so employed and standing upon one of its tracks, was struck by a car which he knew to be switching close to him, his negligence will defeat a recovery, although defendant's custom was to switch the car on to a track other than the one plaintiff was on, and he, relying upon such custom, was paying no attention to the moving car.<sup>26</sup>

- <sup>1</sup> Jersey City, N. & W. Ry. Co. v. Central Ry. Co., 22 Atl. Rep. 728.
- <sup>2</sup> State v. Iowa Cent. Ry. Co., 50 N. W. Rep., 280.
- <sup>3</sup> In re Railroad Com'rs, 50 N. W. Rep., 276.
- <sup>4</sup> State v. Kosonoke R. & L. Co., 13 S. E. Rep., 719.
- <sup>5</sup> McFadden v. May's Landing & E. R. Co., 22 Atl. Rep., 322.
- <sup>6</sup> Kneeland v. Luce, 12 S. Ct. Rep., 32.
- <sup>7</sup> Pitcher v. L. S. & M. S. Ry. Co., 16 N. W. Rep., 62.
- <sup>8</sup> Omaha & R. V. Ry. Co. v. Chollette, 49 N. W. Rep., 1114.
- <sup>9</sup> Hartman v. Pennsylvania R. Co. (Pa. Sup.), 22 A. 701.
- <sup>10</sup> De Van v. F. & N. T. C. R. Co., 28 N. E. Rep., 532.
- <sup>11</sup> McKee v. C. R. I. & P. Ry. Co. (Ia.), 59 N. W. Rep., 209.
- <sup>12</sup> Georgia Midland & G. R. Co. v. Evans, 13 S. E. Rep., 580.
- <sup>13</sup> Phillips v. E. T. V. & S. R. Co., 13 S. E. Rep., 644.
- <sup>14</sup> Lonerken v. Illinois Cent. Ry. Co., 49 N. W. Rep., 852.
- <sup>15</sup> Barber R. & D. Ry. Co., 13 S. E. Rep., 630.
- <sup>16</sup> L. & N. Ry. Co. v. Potts, 17 S. W. Rep., 185.
- <sup>17</sup> Idaho M. R. Co. v. O'Brien, 27 Pac. Rep., 701.
- <sup>18</sup> Russell v. R. & D. R. Co., 47 Fed. Rep., 204.
- <sup>19</sup> Sweet v. Michigan Cent. R. Co., 49 N. W. Rep., 882.
- <sup>20</sup> Latremouille v. Bennington R. R. Co., 22 Atl. Rep., 658.
- <sup>21</sup> Pullituro v. D. L. & W. R. Co., 15 N. Y. Supp., 783.
- <sup>22</sup> Seagel v. C. M. & St. P. R. R. Co., 49 N. W. Rep., 960.
- <sup>23</sup> McClary v. C. M. & St. P. R. R. Co., 49 N. W. Rep., 963.
- <sup>24</sup> Barrett v. Northeastern R. Co., 13 S. E. Rep., 648.
- <sup>25</sup> Russell v. R. & D. R. Co., 47 Fed. Rep., 204.
- <sup>26</sup> Collins v. B. C. R. & N. Ry. Co., 49 N. W. Rep., 848.

## MEETINGS AND ANNOUNCEMENTS.

### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

- Canadian Pacific*, semi-annual, 2½ per cent., payable Feb. 15.
- Chicago & Alton*, quarterly, 2 per cent. on the common and preferred stock, payable March 1.
- Chicago, Burlington & Quincy*, quarterly, 1½ per cent., payable March 15.
- Chicago & West Michigan*, semi-annual, 2 per cent., payable Feb. 15.
- Cleveland & Pittsburgh*, quarterly, 1½ per cent., payable March 1.
- Mexican Northern*, quarterly, 1½ per cent., an extra ½ per cent., both payable Feb. 15.
- Old Colony*, \$1.45 per share, payable March 1.
- St. Paul & Duluth*, semi-annual, 3½ per cent. on the preferred stock, payable March 1.
- York Harbor & Beach*, \$1.50 per share, payable Feb. 1.

### Stockholders Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

- Atlanta & Charlotte*, air line, general, New York City, N. Y., March 9.
- Brooklyn Elevated*, annual, adjourned, 31 Sands street, Brooklyn, N. Y., Feb. 20.
- Camden & Atlantic*, annual, Cooper Point, Camden, N. J., Feb. 25.
- Chesapeake & Ohio*, annual, Richmond, Va., Feb. 23.
- Chicago Junction Railways & Union Stock Yards Co.*, special, New York, N. Y., March 1.
- Chippewa Valley*, annual, Mount Pleasant, Mich., Feb. 17.
- Delaware, Lackawanna & Western*, annual, 22 William street, New York City, Feb. 23.
- Fort Worth & Denver City*, annual, Fort Worth, Tex., March 1.
- Grand Rapids & Indiana*, annual, Grand Rapids, Mich., March 2.
- Missouri Pacific*, annual, St. Louis, Mo., March 8.
- New York, Lackawanna & Western*, annual, New York, N. Y., Feb. 23.
- New York, Susquehanna & Western*, annual, Jersey City, N. J., Feb. 25.
- Norfolk & Southern*, annual, Norfolk, Va., March 3.
- Northern Central*, annual, Baltimore, Md., Feb. 25.
- Pennsylvania & Northwestern*, annual, Philadelphia, Pa., Feb. 17.
- Scioto Valley & New England*, annual, Columbus, O., Feb. 11.
- St. Louis, Iron Mountain & Southern*, annual, St. Louis, Mo., March 8.
- Wichita Valley*, annual, Wichita Falls, Tex., March 8.

### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

- The *Railway Freight Claim Association of the Eastern, Western and Southern States* will hold its regular semi-annual meeting at the Grand Pacific Hotel, Chicago, Ill., March 3.
- The *New England Railroad Club* holds regular meetings at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.
- The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.
- The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.
- The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.
- The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.
- The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.
- The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.
- The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.
- The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 300, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 301 and 302 Washington Building, Tacoma, Wash.

### American Association of General Passenger and Ticket Agents.

The Thirty-seventh annual meeting of this association will be held at the Hotel Del Monte, Monterey, Cal., at 11 o'clock a. m., March 15. The Southern Pacific will furnish transportation to members and their families, and will carry special cars on its regular trains and special trains, with members and their families, provided timely notice is given. The Atchison, Topeka & Santa Fe will furnish free transportation for members and their families, and if special car parties are arranged for, the company will haul them free, provided such cars can be handled on regular trains.

### American Institute of Electrical Engineers.

A meeting will be held at 12 West Thirty-first street, New York City, Feb. 16, at 8 o'clock p. m. A paper will be read by Lieut. F. Jarvis Patten, on "A Proposed New System of Alternating Direct Current Transformation."

### Engineering Society Meeting at Toronto.

The regular meeting of the Engineering Society of the School of Science was held at Toronto last week. An interesting paper on the computation of earthworks and overhaul was read by E. F. Ball. He explained a method, now in use on the Lehigh Valley Railroad, of calculating the quantities involved with great accuracy, and with about one-fifth of the work necessary by some of the older systems. The paper was well illustrated by diagrams. In the discussion which followed, many interesting points were brought out.

### Engineers' Club of Philadelphia.

A business meeting was held Feb. 6, President James Christie in the chair, and about 50 members present.

The tellers reported the adoption of an amendment to the By-Laws, providing for the appointment of a Nominating Committee to supply vacancies in the ticket for the annual election of officers.

The President was authorized to appoint from the Committee on Land-locked Navigation a sub-committee to co-operate with similar committees in other cities with reference to a proposed ship canal across the state of New Jersey.

Mr. J. J. McKee exhibited a series of lantern slides, illustrating the progress of work upon the pipe lines of the East Jersey Water Co. Mr. Clemens Herschel, the Engineer in charge of the work, participated in the discussion which followed.

Owing to the lateness of the hour a letter from Capt. Smith S. Leach, describing the methods employed in the improvement of the Mississippi River at Plum Point Reach, was deferred.

### Engineers' Club of St. Louis.

The club met Feb. 3 at 8 p. m., President Johnson in the chair and 30 members and six visitors present. J. W. Woerman was elected a member of the club.

Mr. A. L. Johnson read a paper on "Shop Work Inspection." The paper spoke of the difficult position of the inspector, the duties he has to perform, and how best achieved. The processes of manufacture in mill and shop were taken up in detail and discussed. The writer opposed as unnecessary the requirement in the specifications for ½-inch round blow tests for steel. He also thought open hearth steel more reliable than Bessemer. He favored only one reaming in the shop, the holes being punched ½-in. smaller than the diameter of the rivet and then reamed after assembling, insuring more solid holes. The unreliability of machine countersunk



rivets was also mentioned, and some reasons given therefor. The paper gave a method for keeping a very rigid account of the daily progress of all the parts of the structure under contract, from the mill to the finished member. This is especially advantageous in case any legal complications arise about the delay of the work. Tables were also given for the facilitation of the inspection and a more perfect record of the shop work. Discussion followed by Messrs. Johnson, Gayler, Crosby, Hermann, Burnet, Ockerson, Pegram, Wheeler, Baier.

Mr. Robert Burgess, one of the engineers of the Intercontinental Railway Survey, gave a short description of the work of the survey in the northern part of South America.

#### New York Railroad Club.

A regular meeting of the club will be held Feb. 18, at 7:30 p. m., at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York.

The Executive Committee request Members to come prepared to present topics for informal discussion. This they think will be more popular than the reading and discussion of a stated paper.

The January meeting was very successful in point of attendance and interest, and it is hoped that the next one will be equally so.

#### Western Railway Club.

At the meeting of the Western Railway Club next Tuesday a paper will be presented on the Strength of the Master Car Builder's Type of Coupler, by Mr. William Forsyth.

### PERSONAL.

—Capt. John R. Nolan, Secretary and General Manager of the Wilmington Sea Coast Road, has resigned those positions, to take effect March 1.

—Mr. Amos R. Barrett, Division Master Mechanic of the Boston & Maine, was appointed Superintendent of Motive Power of that road last week, to succeed the late Mr. William Smith.

—Mr. E. G. Bleker, General Baggage Agent on the Atlantic Division of the Southern Pacific for the lines west of Orange, Tex., died at Houston, Tex., Feb. 6, of pneumonia, after a very short illness.

—Mr. W. B. Bulling, Jr., Division Freight Agent of the Canadian Pacific at Montreal, has been appointed General Freight Agent of the Western Division, having charge of the freight traffic east of Port Arthur, Ont.

—Mr. Frank M. Wilder, formerly Superintendent of Motive Power of the New York, Lake Erie & Western, is now Foreman in the shops of the Delaware, Lackawanna & Western at Buffalo. Mr. Wilder is reported to have declined several positions in the mechanical departments of other roads since he accepted his present position.

—Mr. Franklin P. Kaercher, Secretary of the Philadelphia Coal & Iron Co., has been appointed General Manager of the Montour Iron & Steel Co., in addition to the position he holds with the Philadelphia & Reading Coal & Iron Co. Mr. Kaercher has been and still is Secretary of the Montour Company.

—Mr. John N. Van Wagener, who has been Superintendent of Bridges of the New York Central Railroad on the Hudson River Division since last April, died at Troy, N. Y., Feb. 7. He was formerly Superintendent of the Troy Union Railroad and was a director and officer of several manufacturing companies in northern New York.

—Capt. Robert Anderson, whose last railroad service was with the Western & Atlantic in the capacity of General Superintendent, died last week at Atlanta, Ga., aged 55 years. He was with the Western & Atlantic for more than 30 years as Clerk, Agent, Assistant General Freight Agent and General Freight Agent. He retired soon after the line was leased to the Nashville, Chattanooga & St. Louis.

—Mr. A. G. Blair, Traffic Manager of the Wheeling & Lake Erie, has been appointed General Manager of the road, and the former office has been abolished. Mr. Blair was formerly connected with the traffic department of the Canada Southern, when Mr. M. D. Woodward was Division Superintendent, and was appointed General Freight Agent of the Wheeling & Lake Erie in 1882, when Mr. Woodward became connected with that road.

—Mr. John W. Sanborn has been formally elected Acting General Manager of the Boston & Maine by the Board of Directors of that company, pending the appointment of a permanent successor to the late Mr. James F. Furber. Mr. Sanborn is at present Superintendent of the Northern or White Mountain division of the Boston & Maine, a position which he has held since 1884. He is now about 70 years old and has been connected with railroad service for the last 25 years. He was Division Superintendent of the Eastern Railroad of Massachusetts for a number of years before the consolidation with the Boston & Maine.

—Mr. E. A. Chittendon, Superintendent of Local Freight Traffic of the Central Vermont, has been recently appointed General Freight Agent and has been succeeded in his former position by Mr. George Cassidy, who is at present Assistant Superintendent of Local Freight Traffic. Mr. Chittendon has been connected with the Vermont Central, and its successor, the Central Vermont, for the last 23 years, and has been freight clerk, station agent and lost car and freight agent. He has been Superintendent of Local Freight Traffic since 1878.

—Mr. Lucien W. Palmer, Superintendent of the Providence Division of the New York & New England, resigned this week and has been succeeded by Mr. W. S. Jones, Assistant Superintendent of the Middle Division of the Rome, Watertown & Ogdensburg. Mr. Palmer has been connected with the New York & New England since 1875, first as Freight Agent and for the last 14 years as Superintendent of the Providence Division. He has been in railroad service since 1866, and all of this time on New England railroads, except for two years about 1874, when he was on the Cairo & Vincennes road as Superintendent, and agent for the bondholders.

### ELECTIONS AND APPOINTMENTS.

**Baltimore & Ohio Southwestern.**—The annual meeting of the stockholders was held in Cincinnati, Feb. 10. The following were elected directors: Edward R. Bacon,

H. W. Poor, New York; Orland Smith, W. P. Harvey, Baltimore; W. T. McClintock, Amos Smith, Chillicothe, O.; Patrick Buchanan, George H. Hopkinson, London; W. W. Peabody, Lewie Emerson, Fred H. Alme, Cincinnati. Officers for the ensuing year were elected as follows: E. R. Bacon, President; W. W. Peabody, Vice-President; William E. Jones, Treasurer; W. W. Peabody, Jr., Secretary.

**Baltimore, Richmond & Southern.**—The incorporators are: John G. Slater, T. F. Miner, J. L. Barbour, Witcher Jones, T. Roessville, Sidney J. Dudley, L. G. Ashby and Charles W. Turner.

**Bayard, Petersburg & Moorfield.**—The stockholders of the railroad held a meeting last Thursday at Piedmont, W. Va., and elected the following board of directors: John G. Hoffman, Jr., of Wheeling; S. Jamson, of Piedmont; Russell Sturgis, of Boston, Mass., and W. Smith, of Milton, Pa.; J. W. Nihiser and J. R. Reese, of Bayard, W. Va.; A. B. Shaw and Mr. McBrown, of Maryland City, and A. A. Scherer, of Mayaville. Mr. Hoffman was elected President, and Mr. Jamson Vice-President.

**Canadian Pacific.**—W. B. Bulling, Jr., District Freight Agent at Montreal, has been appointed General Freight Agent of the Eastern Division, in charge of the traffic of the lines from Port Arthur to Quebec; also the Ontario and Quebec Division, Smith Falls to Meaganic, and branch lines inclusive. Owing to the protracted illness of J. A. Houston, District Freight Agent at Ottawa, all communications relating to business connected with Mr. Houston's district must be directed to Mr. Bulling, at Montreal.

**Central New England & Western.**—At a meeting of the company in Philadelphia last week, the resignations of F. G. Odenheimer, Howard Hancock, Thomas M. Richards, W. R. Taylor, A. H. O'Brien, Albert Foster, and Daniel Jones, who had been elected directors temporarily, were accepted and A. R. Atkins, James Armstrong, John H. Taylor, M. A. Viele, W. U. Jenks, C. S. Gilson, and Piersen Brown, of New York, were elected to fill the vacancies. The other members of the board are A. A. McLeod, Arthur Brock, W. W. Gibbs, Charlesmagne Tower, John W. Brock, and Joseph F. Sinnott, of Philadelphia.

**Central Vermont.**—The following appointments have been announced: E. A. Chittendon has been appointed General Freight Agent; George Cassidy has been appointed Assistant General Freight Agent; J. A. Southard is appointed Division Freight Agent, with office in New London, Conn.

**Chesapeake & West Virginia.**—The following are the incorporators of the company in Virginia: Francis O. French, Hugh R. Garden, J. J. Deery, T. A. Beall, and H. D. Garden, of New York; P. Heoner, of Philadelphia, and William P. De Saussure, W. W. Woodward, C. M. White, J. R. Marchant, Mr. Jones, James N. Stubbs, William Campbell, C. B. Jones, C. E. Nicol, and Chancellor Bailey, of Virginia.

**Chicago, Burlington & Quincy.**—The following changes are announced: J. H. Palmer, Assistant General Passenger Agent, becomes General Traveling Agent, and George B. Dunbar, late Assistant General Passenger Agent, becomes Assistant Auditor. H. C. Orr, General Ticket Agent at Kansas City, becomes General Passenger and Ticket Agent with headquarters in St. Louis.

**Chicago & South Bend.**—C. A. Carlisle has been appointed Assistant General Manager and Purchasing Agent of this company, with headquarters at South Bend, Ind.

**Cleveland, Cincinnati, Chicago & St. Louis.**—The headquarters of William Gibson, recently appointed Superintendent of the Cincinnati Division, have been removed temporarily to Springfield, Ill. The headquarters of the division will probably be transferred back to Cincinnati in a few months.

G. W. Kittredge, Chief Engineer, has removed his headquarters from Indianapolis to Cincinnati, O.

**Cumberland Valley & Martinsburg.**—The following is the list of directors elected at the recent annual meeting, and corrects the statement printed last week: Thomas B. Kennedy, Chauncey Ives, M. C. Kennedy, George M. Bowers, A. J. Thomas, Holmes Conrad, J. F. Boyd, John Stewart, E. Boyd Falkner, William T. Stewart, James B. Russell, German Smith and R. W. Stone. The directors elected Thomas R. Kennedy President, M. T. Ingles Secretary, and James B. Russell Treasurer.

**Great Northern.**—Thomas J. Hayman, who has been Auditor of the Wisconsin Central, has been appointed Assistant to the President of the Great Northern, a position that has been vacant since the retirement of John N. Abbott six months ago.

**Houston & Texas Central.**—W. G. Neimyer has been appointed General Western Agent of this company, with headquarters at 204 Clark street, Chicago, Ill.

**Illinois Central.**—J. W. Higgins has been appointed Acting Assistant Division Superintendent of Louisiana Division, with office at McComb City, Miss. He has been Chief Clerk at the general superintendent's office at Chicago, and the position to which he has been appointed is a new one.

**Jonesville.**—The company has been incorporated in Virginia by H. J. Morgan, B. H. Sewell, C. T. Duncan, J. A. G. Hyatt, H. C. T. Richmond, C. Slemph, Harvey Young, M. S. Ball, E. W. Pennington, H. C. Joslyn, A. M. Gouss, A. W. Cook, J. B. Richmond, J. B. F. Mills, C. F. Flannery, and others.

**Kansas City, Fort Smith & Southern.**—At a meeting of directors at Neosho, Mo., Feb. 4, the following officers were elected: President, B. Stevens, Jr., of Philadelphia, late of the Pennsylvania; Secretary, J. C. Cravens, of Springfield, Mo.; Superintendent, P. D. Peters; Auditor, B. W. Requa; General Attorney, J. W. North.

**Keokuk & Western.**—The annual meeting of the stockholders was held at Keokuk, Ia., Feb. 3. The following directors were elected: T. DeWitt Cuyler, Philadelphia; John Paton, Benjamin Strong, Benjamin Graham, W. H. Gebbard, New York; Gen. F. M. Drake, Centerville, Ia.; G. H. Candee, Lowell, Mass.; F. T. Hughes and A. C. Goodrich, Keokuk, Ia.

**Louisville Southern.**—Horace F. Smith, General Contracting Agent at Louisville, of the East Tennessee, Virginia & Georgia system, and Western Contracting Agent of the Virginia, Tennessee & Georgia Air Line,

has been appointed Superintendent of Terminals of the Louisville Southern Railroad. He will hold the other positions as well. Mr. Smith was formerly Superintendent of Terminals of the Louisville & Nashville.

**Missouri, Kansas & Eastern.**—The first board of directors of this company, organized in Missouri, is composed of the following business men of St. Louis: E. C. Simmons, George D. Dana, S. M. Kennard, Louis C. Nelson, L. B. Tebbetts, Christian F. G. Meyer, Stephen A. Gore, James B. Case, Thomas H. McKittrick, Eugene F. Williams, D. D. Walker, Marcus Bernheimer and Ellis Wainwright.

**Missouri, Kansas & Texas.**—W. G. Graham, General Passenger Agent of the Missouri, Kansas & Texas Railway in Missouri, has been appointed to succeed Gaston Meslier as General Passenger Agent of the system, and will remove from Sedalia, Mo., his present headquarters, to Parsons, Kan., where the general officers are located.

**Mobile & Ohio.**—At a meeting of the general mortgage debenture bondholders in New York this week the Farmers Loan & Trust Co., trustee of the debenture bonds, was instructed to vote at the election on Feb. 17 for these directors for the ensuing year: James C. Clarke, A. Iselin, Jr., A. H. Stevens, F. D. Tappen, E. L. Russell, H. B. Plant, James H. Fay, Sidney Shepard, James M. Masson, R. K. Dow, Thomas W. Evans, John Paton and W. Butler Duncan.

**New York & New Jersey Terminal.**—The stockholders held their annual meeting in New York Feb. 9. The following Board of Directors was re-elected: Thomas Butler, General H. W. Slocum, Charles F. Smilie, Isaac P. Martin, Welcome S. Jarr, Thomas Sturgis, William C. Love, Isaac D. Fletcher, William Marshall, W. D. Guthrie, Julian A. Hawks, Charles S. Brown and General Roy Stone.

**Northern Pacific.**—The Purchasing Departments of the Northern Pacific and Wisconsin Central have been consolidated and the headquarters of the General Purchasing Agent, W. G. Pearce, removed from St. Paul to Chicago. W. P. Howe has been appointed Assistant Purchasing Agent, with offices in St. Paul.

**Ohio Connecting.**—The annual meeting of the company, one of the Pennsylvania branches, was held at Pittsburgh, Feb. 2. The following officers and directors were elected: President, Thomas D. Messler; Secretary, S. B. Liggett; Directors, James McCrea, John E. Davidson, William Mullins, John W. Renner, J. J. Brooks, A. McElvey, S. B. Liggett and T. H. B. McKnight.

**Pennsylvania Lines.**—B. F. Crawford, of Altoona, Pa., has assumed the position of Master Mechanic of the car and locomotive works, at Ft. Wayne, Ind.

**Philadelphia & Erie.**—The annual meeting was held in Philadelphia Feb. 8. The following directors were elected: W. Hassel Wilson, J. N. Du Barry, Samuel G. Thompson, N. Parker Shortridge, Henry D. Welsh, William J. Howard, William L. Elkins, Amos R. Little, J. Bayard Henry and W. H. Barnes, who succeeded the late Wistar Morris.

**Richmond & Danville.**—H. Jackson, of Atlanta, Ga., has been appointed Assistant General Counsel for the Central Division in the States of Georgia, Alabama and Tennessee. Local counsel will be appointed in the other States, reporting to the General Counsel, Hoadly, Lauterbach & Johnson, of New York City. The office of Southern General Counsel, formerly held by Calhoun, King & Spaulding, has been abolished.

J. H. Beall has been appointed Traveling Agent with headquarters at Washington, D. C. A. W. Taylor, Eastern Passenger Agent, with headquarters at 221 Broadway, New York, has been transferred to Savannah, Ga., to become Chief Clerk of the Passenger Department.

**Waynesburg & Washington.**—The annual meeting was held in Pittsburgh, Feb. 2. Officers and directors were chosen as follows: President, George B. Roberts; Vice-President, Thomas D. Messler; Directors, Thomas D. Messler, James McCrea, J. D. Brooks, J. E. Davidson, William Mullins, J. J. Brooks, J. D. Du Barry, I. F. Temple, Jacob Smart, Abner Thorpe, W. T. Lantz and Jonathan Allison. J. Allison was chosen to succeed the late W. S. Bryson, of Washington.

**Wheeling & Lake Erie.**—A. G. Blair has been appointed General Manager, and the following appointments have also been made: Henry J. Booth to be General Freight Agent, having been promoted from the position of Assistant General Freight Agent, the latter office being now abolished. William H. Vance has been appointed Coal Traffic Agent, and will have direct charge of all matters relating to that department. The office of Traffic Manager is abolished, the heads of the freight, passenger and coal departments reporting direct to the General Manager. The title of F. H. Stark, General Car Foreman, has been changed to Master Car Builder, with full charge of car shops at Ironville, O.

**Williamsport & North Branch.**—The company, which recently passed out of the control of George L. Sanderson, has been reorganized. The following new officers were elected last week: President, Henry C. McCormick; Vice-President, John Sotterfield; Treasurer, J. Henry Cochran; Secretary, Seth T. McCormick; Board of Directors, Henry C. McCormick, Seth T. McCormick, E. R. Payne, J. Henry Cochran, H. L. Taylor and John Sotterfield.

**Wilmington Sea Coast.**—The annual meeting was held in Wilmington, N. C., Feb. 2. The following Board of Directors was elected: E. S. Latimer, G. H. Smith, James H. Chadbourne, Jr., Wm. H. Chadbourne, B. G. Worth, Oscar Pearsall and George R. French. The Directors re-elected George R. French, President. Mr. B. G. Worth, Vice-President, declined a re-election, and G. H. Smith was elected Vice-President.

**Wisconsin Central.**—M. P. Martin has been appointed Auditor of the Wisconsin Central, Chicago & Northern Pacific and Chicago & Calumet Terminal roads, succeeding T. J. Hyman, resigned to accept service with another company. Mr. Martin was formerly Assistant Auditor of the Northern Pacific. The headquarters of this department will be removed from Chicago to St. Paul.

**York & Schuylkill.**—The following are the incorporators of this Pennsylvania company: Charles R. McConkey, Peach Bottom, Pa., President, and Lewis R. Stubbs and Edgar L. Ramsay, of Delta, Pa.; Henry A. McConkey and C. Reynolds McConkey, Peach Bottom, Pa.; John A. Shinn and M. H. Houseman, Baltimore, Md.



RAILROAD CONSTRUCTION,  
Incorporations, Surveys, Etc.

**Aberdeen & Victoria.**—A local company has been organized at Aberdeen, Wash., to build a railroad from Aberdeen to the Straits of San Juan de Fuca. W. R. Book, J. M. Weatherwax, C. T. Wooding, J. G. Lewis, E. France and S. Beme are the incorporators. The plans are not fully matured yet, but the surveys will begin work at once, and the grading will commence as soon as the weather permits. Money enough to build 25 miles has already been pledged.

**Ahnapee & Western.**—Nearly all the grading has been completed on this line to Ahnapee, Wis., and the ties and timber for trestles have been contracted for and will be ready for delivery in a few weeks. The line now being built extends from Casco, on the Kewaunee, Green Bay & Western, northeast to Ahnapee, a distance of 13 miles. The contractors for the grading are McDougal & Beacom, of Milwaukee. The surveys have been made north of Ahnapee for about 19 miles to Sturgeon Bay, but contracts for this section have not yet been let. There will be very little difficult work on any part of the 32 miles which it is proposed to build. The grading averages about 8,500 yards to the mile, and the maximum curves, six degrees, will only be necessary in a few places. The road is being built largely by local aid voted by the towns, and when these funds have been expended the projectors will probably issue bonds to complete the road. E. Decker, of Ahnapee, is President, and F. E. Halliday is Engineer.

**Atlantic Coast Line.**—The extension of the Wilson & Fayetteville branch to Rowland, S. C., has been practically completed and it is expected that the balance of the tracklaying will be finished this week. The new line is 43 miles long and will probably be opened for traffic in about 30 days. The tracklaying has been commenced on a branch of the Wilmington & Weldon east to Washington, N. C., the work being done by convicts. The new branch starts from the Albemarle & Raleigh junction, near Greenville, and extends along the south shore of the Pamlico River, a distance of 24 miles, to Washington.

**Austin & Northwestern.**—The engineers have completed the cross-sectioning of the extension to Llano for nearly ten miles from Fairland, Tex., and the contractors, Ricker, Lee & Co., of Galveston, have begun the grading. Sub-contracts have been let to Sweeney Bros. and Maloney & Bolen. Altogether five sub-contracts have been let and a large force is at work on the grading. Ricker, Lee & Co. have commenced the masonry for the piers of the Colorado River bridge.

**Baltimore, Richmond & Southern.**—The road proposed by this company, recently organized in Virginia, is to commence on the Potomac River, passing through the counties of Richmond, Essex, Caroline, Middlesex, King and Queen, King William, Hanover and Henrico, by the city of Petersburg, and southwest to the southern boundary line of Virginia, passing through the counties of Chesterfield, Dinwiddie, Amelia, Nottoway, Sussex, Lunenburg, Greensville, Brunswick and Mecklenburg.

**Bangor & Aroostook.**—The surveys have completed the location of the entire line, and the engineers are now preparing the estimates and profiles. The directors expect to let the contract for building a large part of the road as soon as these have been completed. The road is to extend from Brownville, Piscataquis County, to Caribou in Aroostook County, via Houlton and Presque Isle, 154 miles. Branches are to be built from South Presque Isle to Fort Fairfield, 12 miles, and from Dyer Brook to Ashland, 42 miles. The maximum grade is 52 ft. a mile, and the work will be principally earth excavation and but little rock. There will be nearly 40 bridges. Nearly one million of the preferred stock of the company has been subscribed—\$500,000 by Aroostook County and \$200,000 by the American Express Co. A. A. Burleigh, of Houlton, Me., is President, and Moses Burpee, also of Houlton, is Chief Engineer.

**Birmingham, Sheffield & Tennessee River.**—A party of engineers under charge of the Chief Engineer have just completed a survey from Parrish Junction, in Walker County, southeast to Birmingham, Ala., a distance of 40 miles, running through rich coal fields. The directors now have the estimates under consideration and it is believed that they will order work commenced on the construction of the line in the spring.

**Burlington & Missouri River.**—The extension west of Gillette, Wyo., is now under contract for a distance of about 30 miles, and grading is in progress on nearly all this section. The new work is an extension of the Grand Island & Wyoming Northern line through Northern Wyoming toward Buffalo, which was built last year through the Black Hills from near Merino. There is a great deal of rock work on the first seven miles of the branch now under contract, and men have been at work on this section all the winter. Kilpatrick Bros. & Collins, of Beatrice, Neb., are the contractors.

**Butters Lumber Co.**—The railroad being built for this company will be about five miles long, extending from Hub, N. C., north through Columbus County toward the Lumber River. About four miles of the line has been completed at present. The line now being built is to be used as a private logging road, but it is proposed to extend it for a considerable distance north of the present terminus and it may then be incorporated and used for freight and passenger traffic.

**Charleston, Clendennin & Sutton.**—This company has secured the rights of way designated by its engineers in the permanent survey from Charleston, W. Va., to the Clay County line, except at one point. Condemnation suits were decided in the Kanawha County court last week, all for lands lying along the south side of Elk River. This company will award the contract for building the line next week, and it is the intention to have work begun by March 1.

**Chesapeake & Ohio.**—The company has a party of 18 engineers at work on a survey for a line from the Kanawha River, near Charleston, W. Va., up Elk River. The new line is to be a branch of the main line, built up the Elk River to reach coal and timber in that section, which is the tributary to it. The new line has been located for a distance of 21 miles.

**Chesapeake & West Virginia.**—The company is applying to the Virginia legislature for incorporation. It proposes to build a road extending from a point on the Chesapeake Bay in the counties of Gloucester or Middlesex westerly to the Blue Ridge Mountains between Browns and Manassas Gap, and thence to the Shenandoah Mountains and to the West Virginia line bounding on the counties of Rockingham or Shenandoah in Virginia.

**Chicago, Rock Island & Pacific.**—A press dispatch from El Reno, I. T., states that grading was begun at that point Feb. 2 on the extension south through Indian Territory to the Red River and toward Fort Worth, Tex. A grading force of 250 teams and nearly 600 men are reported at work on the first 25 miles from El Reno.

**Cleveland, Cincinnati, Chicago & St. Louis.**—Surveyors are at work between Greensburg, Ind., and Lawrenceburg Junction, running a line that will shorten the road more than three miles. This is done in order to eliminate the 17-mile grade east of Lawrenceburg, near the Ohio State line, and to decrease the running time of passenger trains between Chicago and Cincinnati.

**Denver, Lakewood & Golden.**—The company is arranging to build the extension of its line through Denver from its present terminus at the city limits to Arapahoe street. When the ordinance granting the company right of way was passed by the City Council of Denver it was provided that the line should be completed to Arapahoe street by June. The line in the city is to be operated by electricity. A branch is being built from Lakewood, Col., a new town about halfway between Denver and Golden, which will extend for about eight miles from the connection with the main line.

**Duluth, Pierre & Black Hills.**—It is reported that the necessary funds for completing the grading from Aberdeen southwest to Pierre, S. Dak., have been raised, and that the right of way for the remainder of the line is now being secured. Grading will be recommenced as soon as the weather will permit, and the 30-mile gap between Aberdeen and Pierre will be completed so that trains may begin running early in the fall.

**Findlay Belt.**—The tracklaying on this belt line at Findlay, O., has been resumed and about 2½ miles of track has been laid since Jan. 1. The road when completed will be about six miles long. The tracklaying now in progress is being done by the company. Joseph Ramsey, Jr., of Cincinnati, is President, Louis Zepernick is Engineer, and W. S. Matthias is General Agent.

**Gladesville.**—The incorporation of this company in Virginia was recently noted. The company has a charter to build about 50 miles of road through Wise County, in western Virginia, to the coal fields to the north. It is proposed to build at present, however, a road only five miles long, from Wise Court House, Va., north to Gladesville, near Big Stone Gap, and to a connection with the Norfolk & Western and the Louisville & Nashville. The organization of the company will soon be effected, and the construction work will then be commenced. The road will have a large freight traffic from the first, principally coal and lumber, and a considerable passenger traffic also.

**Grand Trunk.**—This company is applying to the Dominion Parliament for authority to relocate certain parts of the Northern & Pacific Junction road, and to extend that line to a junction with the Canadian Pacific at North Bay, Ont.; to arrange for the purchase of the Nipissing & James Bay line of the Northern & Pacific Junction and for authority to raise the capital necessary to carry out these purposes; for the improvement and reconstruction of parts of the Northern & Pacific Junction and also to consolidate the Northern & Pacific Junction Railway Co. with the Grand Trunk.

**Great Northern.**—It is reported that the company has decided to change its main line near Fort Benton, Mont., to avoid the heavy grade of Teton Hill. This change will leave Benton four miles from the road, as the station will be built on the Teton River. The proposed line will continue up the Teton through Eight Mile Coulee and join the present line at a point about three miles east of the old Bull's Head station. The change will give a maximum grade of 52.8 ft. to the mile, instead of the present grade of nearly 110 ft.

**Irontdale, Bancroft & Ottawa.**—This road, which is in operation to Irontdale, Ont., is now being graded easterly to Bancroft, in the county of Hastings, and will be built to that point by the end of this summer. The company has a Government subsidy for the line as far as Bancroft.

**Joliet, De Kalb & Northern.**—This company was incorporated in Illinois last week by W. L. Elwood, of De Kalb, and W. W. McDowell, of Chicago. The road is to extend from Joliet in a northeasterly direction to De Kalb, a distance of 45 miles. It is reported that work will be started on this line in the spring, and when it is completed an extension may be begun east of Joliet.

**Jonesville.**—The company has been organized in Virginia to build a road from a point on the Cumberland Valley extension of the Louisville & Nashville between Pennington Gap and Hubbard Springs in Lee County, Va., to a point near the town of Jonesville, and thence through Lee County to the Virginia and Tennessee state line near Mulberry Gap.

**Kansas City, Watkins & Gulf.**—The contractors have not been able to complete the line to Alexandria, La., by Feb. 1, as expected, and have 200 men at work south of Alexandria, La. The grading has been completed with the exception of a three-mile section, and the track has now been laid for 62 miles from Lake Charles. The contractors are Kennedy & Stone, of Topeka, Kan. The heaviest work is near the Red River, where for 15 miles the road extends through a rough country until it reaches the valley. Two long trestles on the line are now being completed, one at Spring Creek, 3,150 ft. long, and one at Indian Creek 1,000 ft. long.

**Kings County Elevated (Brooklyn).**—Work is progressing on the extension of the elevated structure from Schenck avenue, the present terminus of the road, southeasterly along Eastern Parkway to Logan street, Brooklyn, a distance of about one mile. The line will be opened to Linwood avenue on Feb. 22, and to Montauk avenue, the last station, by April 1.

**Lancaster, Cecil & Southern.**—The permanent survey of this line is almost completed and the work will be ready to let to contract in two weeks. A large corps of engineers, including several in the employ of the Oxford & Ohio and representatives of the Lancaster, Oxford & Southern, are almost through with the work. The new line is to connect with the Lancaster, Oxford & Southern at the state line of Pennsylvania and Maryland, and with the Baltimore & Ohio at Childs, Md. The terminus of the road will be at Elkton, Md. It is stated that the grading will begin as soon as the contracts can be let.

**Missouri, Kansas & Texas.**—The St. Louis newspapers have had a good deal to say in the last few weeks about a reported extension of this line from Boonville, on the Missouri River, to St. Louis. It is said

that the Missouri, Kansas & Eastern, a company just incorporated, with a capital stock of \$1,000,000, has been organized to build the new line in the interest of the company. The proposals for the construction of the line are still very indefinite, but the directors are expected to take some action in a few days.

**New Roads.**—A number of Chicago capitalists are organizing a company which will soon be incorporated in Indiana to build a railroad from Hammond, near the Illinois state line, easterly to La Porte, Ind., a distance of about 40 miles. The capital stock of the company will be \$200,000. The new line will connect at Hammond with nearly all the roads entering Chicago from the east, and with the Chicago & West Michigan at La Porte, the object in constructing it being to give direct communication between the coal fields of northern Indiana and the lumber regions of Michigan.

A party of Pueblo surveyors have begun a preliminary survey for a railroad from Florence, Col., south to Cripple Creek. The grade is an easy one and a comparatively small sum will build the road, which will be narrow gauge, the distance being only 24 miles.

A committee of business men of Durango, Colo., has been appointed to arrange for the construction of a line to the mines at Creede, Colo. A company will probably be organized and chartered at once, and much of the stock will be taken by local capital at Durango. Surveys have been made and a committee is now at work preparing the data for this new line. The route is from Durango by way of Florida River, thence to Pine River, along Pine River to the Winuchel Pass and down the Rio Grande River, touching the new mining camp of Creede, 60 miles long. The grades are comparatively easy, and the pass is said to be the easiest and most practicable on the Continental Divide, being heavily timbered and at an elevation of less than 10,000 ft. The new route will open up the large mineral deposits of silver, lead and iron in the famous Pine River region, and also numerous deposits of bituminous coal.

**Norfolk & Western.**—Work has been resumed on several sections of the Ohio River extension, where it was discontinued a month ago on account of cold weather and bad roads. The section between Williamson and Pigeon tunnel is being pushed forward rapidly, and the contractors promise to have it finished and the track laid by July.

The company has made arrangements for securing at once the \$2,000,000 needed to insure early completion of the Ohio extension. Work on this extension has been going rather slowly under the financial arrangements previously made, and there has been a desire to make the expenditure on the extension, already amounting to \$7,000,000, productive by connecting the Scioto Valley division with the main line. Kuhn, Loeb & Co., of New York, have agreed to provide one half of the amount needed if the company secured subscriptions for the remainder, which has been done. The basis is a loan to the company for two years at six per cent. per annum, the loan to be repaid by the sale of stock to be authorized in the future.

**Ocala, Altoona, Deland & New Smyrna.**—The incorporators are completing the organization of the company, and officers will be elected shortly. The survey has not yet been made, but the engineers will probably begin this work in the spring. The line is to connect the phosphate regions of South Florida with deep water on the Atlantic Ocean, the terminals being at Ocala and New Smyrna; Altoona and Deland being the principal towns on the line. F. J. Hinson, of Astor, is one of the directors.

**Odesa & Middletown.**—The property of the company was attached last week by the sub-contractors and the court has ordered that it be sold. The work on the line has been entirely abandoned and there seems to be little prospect of its completion. The company has met with considerable opposition since its organization and was unable to secure the right of way. It began to build along the county road, but an injunction was secured which compelled them to stop that work. The line is about four miles long, extending from Odesa to Middletown, Del.

**Parry Sound Colonization.**—The construction work on this line is still being carried on, the road being now open to Bear Lake, west of Emsdale, Ont., and the rails have been laid some distance beyond. S. B. Paulin, of Emsdale, the Chief Engineer, will shortly commence the permanent survey for the balance of the line to Parry Sound, Ont., about 48 miles west of the junction with the Grand Trunk near Emsdale.

**Pennsylvania.**—It is announced that the short line between Shenandoah and Pottsville, Pa., which was abandoned two months ago because of extensive cavings of the surface, will be in condition for travel this week.

**Pittsburgh, Ohio Valley & Cincinnati.**—Work has progressed so rapidly on this line within the last two months, that with 30 days of continuous good weather the road can be completed to Powhatan, O., which will be the terminus of the line for the present. It is a branch of the Pennsylvania, starting at Bellaire, O., and running down the Ohio Valley, 25 miles to Powhatan.

**Potts Valley Railroad & Iron Co.**—The Virginia Legislature has taken favorable action upon the charter of this company which was drawn by the Potts Creek Iron Co., which proposes building the line. It will begin on the Chesapeake & Ohio near Cornington, Va., in the Potts Creek Valley, and extend to the State line, where it is to connect with the West Virginia & Pittsburgh, now building in that direction. It will also make a connection with the Norfolk & Western at Big Stony Creek in Giles County, Va. The preliminary surveys of the line have already been made, and the permanent line will be established as soon as the engineers can complete the surveys.

**Red River Valley.**—A charter for this company was filed in Minnesota in January, as noted at that time. The railroad which the projectors propose to build is about 80 miles long, extending from East Grand Forks, Minn., along the Red River, touching it at a point opposite Drayton, N. D., and thence north between the lines of the Northern Pacific and the Great Northern roads to the international boundary line.

**Rio Grande Southern.**—A number of branches of this Colorado road are projected and it is expected that construction will begin during the spring or summer on several of the lines. The time for commencing the work will depend upon the success of the directors in negotiating the sale of new bonds. The first line to be built will probably be an extension from Rico, Col. the terminus of the road, southwest along the San Juan



River, to the Grand Cañon of the Colorado River and to Lee's Ferry. From that point the line will be continued south through Waterpocket, Ariz., to Prescott Junction, on the Atlantic & Pacific. Another of the proposed lines is from Placerville near Dallas through the Shenandoah Valley to Delores, Colo.

**Rio Grande Western.**—The grading has been resumed at Eureka, Utah, the terminus of the Tintic range branch which was built last year from the connection with the main line. Contracts are reported to have been let for extending the line a number of miles west of Eureka and toward the Nevada state line near Fish Springs, a distance altogether of about 220 miles. The line is being built to reach a number of productive mines.

**Tallapoosa.**—Grading was begun at Tallapoosa, Ga., last week by the Tallapoosa Lumber, Manufacturing and Railroad Co., for the line which it proposes to build from that town southwest to Rosanoke, Ala., the northern terminus of the East Alabama road, a distance of about 40 miles. The country is very rough and there will be many heavy grades. The line is being built principally as a lumber road, but will be constructed with some care so that when completed regular freight trains may be run.

**Terre Haute, Saylor Springs & Chester.**—The organization of this company was completed at a meeting at Saylor Springs, Ill., Feb. 4, when officers were elected. The road is projected between Terre Haute, Ind., and Chester, Ill., a distance of 175 miles. A number of towns have already pledged the right of way for the line and the surveys will probably be begun in the spring. The towns of Newton, Ingraham, Louisville and Xenia, Ill., will probably raise enough money for the surveys.

**Turtle Creek Valley.**—This branch of the Pennsylvania will probably be extended to Delmont, Pa. The road was recently completed to Murraysville and connecting with the main line at Irwin station. Engineers are now at work staking off the road from Murraysville to Delmont, several miles further into the country. The grading and track laying will be commenced as soon as the weather will permit, and the road will be completed during the spring.

**West Virginia & Pittsburgh.**—Tracklaying on the extension south toward the Gauley River has been pushed forward all winter, whenever the weather would permit. A large force of men is kept on the line of the road, and every available day is put to good use.

**York & Schuylkill.**—The articles of incorporation for the company were filed in Pennsylvania last week. The new road is to extend from a point on the Baltimore & Lehigh near Red Lion, York County, Pa., to a point near Lorberry Gap, Schuylkill County, Pa., passing through York, Lancaster, Lebanon and Schuylkill counties. The length of the road is about 65 miles. The capital stock is \$650,000. Charles R. McConkey, Peach Bottom, Pa., is President.

#### GENERAL RAILROAD NEWS.

**Charleston, Cincinnati & Chicago.**—The immediate sale of the road was ordered this week by the State court at Jonesboro, Tenn., in the foreclosure proceedings brought by McDonald, Shea & Co., of Knoxville, and William Kenedick, of Kansas City, railroad contractors. These firms brought suit against the company for \$400,000, the amount due on their contracts for construction work on the road in North Carolina and Tennessee. About 310 miles of the road is now being operated from Kingville, near Sumter, S. C., northwest to Marion, N. C., on the Richmond & Danville.

**Chicago Junction Railways & Union Stock Yards Co.**—A stockholders' meeting has been called for March 1 to approve the contract with Messrs. Armour, Morris, Swift and others, to whom the company proposed to issue \$5,000,000 15 year five per cent. income bonds or common stock at par in lieu of such bonds. The contract proposed binds the packers to continue to send for 15 years all live stock consigned to them through the company's yards, and to pay the usual charges and yardage, which shall amount in the next six years to at least \$2,000,000. All suits are to be abandoned, and the Central Stock Yards are to be transferred to the Chicago company, as well as 1,000 acres of the land at Tollston, Ind.

**Intercolonial.**—The Government report just issued shows that the receipts of the road for the year ending June 30, 1892, were \$2,677,395, while the operating expenses were \$3,602,676, or adding the \$79,927 improperly charged to capital account, a deficit during the year of \$704,903. The expenses were \$131,551 greater than in the preceding year. There was also a deficit in the Prince Edward Island Railroad of \$83,732.

**International & Great Northern.**—The second mortgage bondholders of the company approved the plan of organization published last week, at a meeting in New York this week. The meeting represented more than two-thirds of the \$7,000,000 second mortgage bonds. It was also stated that enough of the first mortgage bondholders had already assented to the plan to assure its success.

**New York Central & Hudson River.**—A statement of the gross earnings of the company and its leased lines for January, as compared with those for the corresponding month last year shows: For 1892, \$3,321,860; 1891, \$3,007,851; increase, \$314,009. The figures for 1892 include \$257,509 earnings of the Rome, Watertown & Ogdensburg Railroad.

**Northern Pacific.**—The gross earnings of the company for January, including the earnings of the Wisconsin Central, were, \$1,810,848, as compared with earnings of \$2,123,859 in 1891, the decrease being \$313,013. The operating mileage was 5,199, an increase of 140 miles.

**Philadelphia & Erie.**—The annual report for the last fiscal year shows gross earnings for the year of \$5,201,301, an increase over the year 1890 of \$87,573, or 1.7 per cent. The operating expenses were \$3,347,850, a decrease compared with 1890 of \$42,001. The net earnings for the year were \$1,853,451, a net increase over 1890 of \$123,401. The number of passengers carried was 1,474,081, a decrease of 18,805 from 1890. The number of tons of freight moved was 10,117,562 tons, of which 1,688,047 tons were through freight.

**Philadelphia & Reading.**—One of the most important and far-reaching railroad combinations made in this country was effected this week in the arrangements for the operation by one management of the four great coal lines, which carry more than two-thirds of the anthracite trade, the Reading, the Central of New Jersey, the Lehigh Valley and, perhaps, also the Delaware, Lackawanna & Western. The Reading guarantees in-

terest on the Lehigh Valley and Central of New Jersey, depositing securities for the amount of the interest with Drexel, Morgan & Co. The control of the Delaware, Lackawanna & Western is said to have been secured by the purchase of a majority of the stock. The statement made by Messrs. Drexel, Morgan, & Co., is as follows: "The Philadelphia & Reading has secured by lease or similar arrangements control of the Lehigh Valley and the Central of New Jersey, and guarantees on the Lehigh Valley stock dividends at the rate of five per cent. a year until July 1, 1892, six per cent. for one year afterward, or until July 1, 1893, and seven per cent. per annum after the latter date. The excess of earnings, if any, above seven per cent. will be divided equally between the Lehigh Valley and the Reading companies until the Lehigh Valley receives 10 per cent. dividends. The surplus above such 10 per cent. will then go to the Reading. The Reading guarantees on the Jersey Central stock seven per cent., all excess over and above that figure to be divided equally between the Jersey Central and Reading companies. There will be one central agency or sales department. As these companies control about 75 per cent. of the competitive traffic, the importance of this combination to the coal trade is obvious. President McLeod, of the Reading, said that the 'voting trust' now holding the stock of the Reading Railroad will shortly expire, and the control of the stock of that company has passed already into hands that are friendly to the present management. The Reading has, by lease, acquired control of the Lehigh Valley Railroad, and the lease of the Central of New Jersey is by a corporation in New Jersey, the Port Reading Railroad, the Reading's extension to Perth Amboy. The great benefits of the new arrangements are obvious. In addition to the splendid Reading terminals, now constructing in Philadelphia, the Reading will acquire the terminals of the Lehigh Valley and New Jersey Central in New York harbor. Through the Lehigh Valley's new Western extension there will be provided a direct route to the lakes at Buffalo, with a spacious terminal there. The saving in commissions, agency expenses and the economies of the traffic under the new arrangements are expected to reach several millions of dollars annually, divided among the various roads interested. The financial arrangements have had the active support and co-operation of A. J. Drexel, J. Pierpont Morgan and J. Lowber Welsh, and also of J. Rogers Maxwell and George F. Baker, of the New Jersey Central management. The latter gentlemen and their friends have become the largest holders of Lackawanna stock.

**South Norfolk.**—This company, the Grand Trunk, and the Georgian Bay & Lake Erie have filed in the office of the Secretary of State at Ottawa a duplicate of an agreement between them, for the purchase by the Grand Trunk of the railroad, capital stock and franchise of the South Norfolk Railway Company.

**Tobique Valley.**—This company is applying to the Dominion parliament for authority to lease its line in western New Brunswick east of Perth, Ont., to the Canadian Pacific.

#### TRAFFIC.

##### Chicago Traffic Matters.

CHICAGO, Feb. 10, 1892.  
For some time the Chicago-Northwestern lines have been pro-rating with the Canadian lines on strictly Canadian business to Northwestern points via Chicago. The Grand Trunk has from time to time found it necessary to reduce rates to meet the competition of the "Soo" line from this territory, to which the Chicago roads have assented for the sake of securing this business. Recently a cut was made by the Canadian lines of \$4 on immigrant business from the seaboard to Northwestern points and the Grand Trunk was forced to meet the competition or lose the business. Naturally the Chicago lines object to the extension of the arrangement to the seaboard traffic in which they are themselves directly interested, and they notified the Grand Trunk that they could not consent to pro-rate on this business which was taken at cut rates. A meeting was held here Feb. 6 at which it was decided that unless the Canadian roads restored their rates on this business before Feb. 15, the Chicago lines would terminate the pro-rating arrangement.

Representatives of the Central Traffic lines met here Feb. 4 and again discussed the questions of switching and cartage charges; also mileage charges on private cars. The former matter was referred to a special committee to report this week and it was decided to make no change in the charge of three-fourths cent per mile on private cars.

The regular monthly meetings of the Western Freight and Central Traffic Associations are being held this week and a large number of routine matters are under consideration.

The Commissioners of the Western Traffic Association announce a session Feb. 23 for the hearing of all matters brought before them. The most important subject now announced for hearing is the notice of withdrawal of the Union Pacific from the Colorado-Utah Traffic Association. Representatives of the Union Pacific state that the proposed step is not intended in any way to affect the harmonious working of the associations, but to simplify their association relations as between the Western Traffic and Colorado-Utah associations.

Western Passenger Association lines have declined to agree to the proposition that ironclad signature tickets used in connection with the Republican National Convention in Minneapolis, after having been stamped and witnessed by the terminal agent, should be good to leave Minneapolis no later than the day following date of execution.

The Chicago, Milwaukee & St. Paul has appealed from the ruling of Chairman Finley to the effect that an appeal from the ruling of the chairman may be taken within six days of date of the issue of the ruling. Chairman Finley announces that this appeal will be considered at the March meeting.

The Joint Rate Committee of the Trunk Line and Central Traffic Associations give notice that the provisions of their circular forbidding the consignment of l. c. l. shipments for different parties to agents of freight lines at carload rates, to be distributed by them, applies to all commodities.

**Immigrant Commissions.**—The Commissioners of the Western Traffic Association have issued the following circular in regard to the payment of commissions on immigrant traffic to Pacific Coast points:

"The Commissioners, in a series of rulings, have diligently endeavored to effect the maintenance of an agreed scale of commissions on this business. It was their hope that this scale would be made effective by all lines from and after Jan. 1 of the present year. In this they have been disappointed, notwithstanding their decision that the fixing of an agreed basis of commissions on this business is a requirement of the rules of the

Trans-Continental Association, and that such a basis has been unanimously adopted by its members, which is valid and binding upon all lines. It is still claimed by some that this question is in some way different from other subjects treated in the agreement, and that any and all members are at liberty to give notice of withdrawal therefrom at any time without thereby affecting any other agreement of the association. At least one line, the Southern Pacific, states that arrangements for commissions in excess of the agreed basis are still in force, claiming, however, that it is not acting alone in this matter, but is simply meeting existing competition, and has given notice of its withdrawal from the Commission Agreement as above indicated.

"Under these circumstances the Commissioners have no alternative but to adopt measures necessary to secure uniformity in respect to this traffic, and to enable each line to carry its fair share thereof. This can only be done by permitting each line to pay such commissions on the west-bound seaboard immigrant traffic, above referred to, as may be required to meet the competition of any other lines, and relief to that effect is hereby granted by modifying the Commission Agreement of the Trans-Continental Association which was made effective Jan. 1, 1891, so that lines members of that association are at liberty to pay a commission upon said traffic of not exceeding \$10.75, Missouri River to Pacific coast points, which maximum the Commissioners will increase from time to time whenever reasonable ground is given for thinking such increase necessary to secure uniformity or enable any line to carry its fair share of the traffic. This relief is subject to revocation or amendment at any time by order of the Commissioners. Under this relief time contracts are not allowable, nor should any line enter into any obligation which will embarrass it in resuming the agreed sale, or in discontinuing commission payments altogether, whenever an arrangement to that end can be accomplished."

There seems to be no disagreement among members upon the proposition that the entire abrogation of commission payments should be effected at the earliest possible time, and a proposition to this end, in respect to the business referred to in this order, is now under consideration by the members of the Advisory Board pursuant to a resolution adopted at their last meeting.

Decisions have also been rendered by the Commissioners authorizing a rate of 30 cents per 100 lbs. on lime, car-loads (not including cement, etc.), from Mississippi River points, including Auxvasse, to Colorado common points; authorizing a rate of 77½ cents per 100 lbs. on mining machinery, chloride of lime, crude sulphur and sulphuric acid, carloads, from Chicago to Central City, S. Dak.

##### Traffic Notes.

The Trans-Missouri Association has reduced curled hair for mattresses from first to fourth class.

The Trans-Missouri Freight Association suggests the advisability of raising the California sugar rate from 65 cents to \$1 to Missouri River points.

The Atlantic Coast Dispatch is the name of a fast freight line to run over the line of the Pennsylvania, the Richmond & Danville and associated roads.

The Wisconsin Central will allow holders of second class tickets to travel in sleeping cars between Chicago and St. Paul. The Burlington has already taken this action, and the Chicago, St. Paul & Kansas City did so some years ago.

The Michigan Central ferryboats at Detroit are handling 1,600 cars a day, which is said to be more than ever has been handled before in the history of the road. There is a heavy coal movement westward and a great return of empties.

The Nebraska State Board of Transportation has sent notice to the railroad companies renewing the request that the Nebraska grain dealers be allowed a milling in-transit rate. It is claimed that Omaha will be forced out of business unless the same privileges are allowed that are received at Minneapolis, Kansas City and St. Joseph.

A Merchants' and Shippers' Association has been organized in Chicago for the purpose of securing the lowest possible rate on freight and express and to receive, forward and deliver goods and to regulate and adjust claims for losses and excessive charges. It is claimed that this organization is not opposed to the existing Chicago Freight Bureau.

The Commercial Exchange, of Philadelphia, has protested against what it considers excessive tariffs on wheat from state points to Philadelphia. President McLeod, of the Reading, assures the Exchange that it is the policy of his company to protect the interest tributary to its line and has authorized an immediate examination of the subject. Vice-President Thomson, of the Pennsylvania, has given the Exchange similar assurance.

##### Switching Charges.

The Union Pacific has notified local jobbing and manufacturing houses of an increase of 100 per cent. in switching charges. The consignees protest, and, it is said, are helped in their opposition to the increase by the other railroads.

##### Eastbound Freight Shipments.

The shipments of eastbound freight from Chicago by all the lines for the week ending Feb. 6, amounted to 105,250 tons, against 96,812 tons during the preceding week, an increase of 8,447 tons, and against 75,467 tons during the corresponding week of 1891, an increase of 29,792 tons. The proportions carried by each road were:

Roads.	Wk. to Feb. 4.		Wk. to Jan. 30.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	16,620	15.8	15,406	15.9
Wabash.....	9,398	8.9	7,455	7.7
Lake Shore & Michigan South.....	15,637	14.9	15,993	16.1
Pitts. Ft. Wayne & Chicago.....	15,052	14.5	11,563	11.9
Pitts. Cn., Chicago & St. L.....	9,619	9.1	9,431	9.8
Baltimore & Ohio.....	8,781	8.3	9,721	10.0
Chicago & Grand Trunk.....	8,755	8.3	7,455	7.7
New York, Chic. & St. Louis.....	11,300	10.7	8,693	9.0
Chicago & Erie.....	10,087	9.6	8,426	8.7
Total.....	105,250	100.0	96,812	100.0

Of the above shipments 11,326 tons were flour, 58,653 tons grain, 4,182 tons millstuffs, 6,446 tons cured meats, 9,446 tons dressed beef, 1,683 tons hides and 3,401 tons lumber. The three Vanderbilt lines carried 41.4 per cent. of all the business, while the two Pennsylvania lines carried 23.5 per cent.



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President.T. W. WELSH,  
Supt.JOHN CALDWELL,  
Treasurer.W. W. CARD,  
Secretary.H. H. WESTINGHOUSE,  
General Manager.

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PITTSBURGH, PA., U. S. A.,

MANUFACTURERS OF THE

## WESTINGHOUSE AUTOMATIC BRAKE

The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 22,000 engines and 270,000 cars. This includes (with plain brakes) 180,000 freight cars, which is about 18 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording an opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 120,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception

Year.	No. per year.		Grand total.
1881	105		105
1882	1,085		1,190
1883	4,966		6,156
1884	15,051		21,207
1885	10,410		31,617
1886	8,946		40,563
1887	9,281		49,844
1888	27,696		77,540
1889	26,065		103,605
1890	50,502		154,107

154,107 freight cars fitted with the Westinghouse Automatic Brake, which is more than 15 per cent. of the Entire Freight Car Equipment of this country.

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JOHN B. GRAY, Agent.

C. C. HIGHAM, General Supt.

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NEW YORK OFFICE,  
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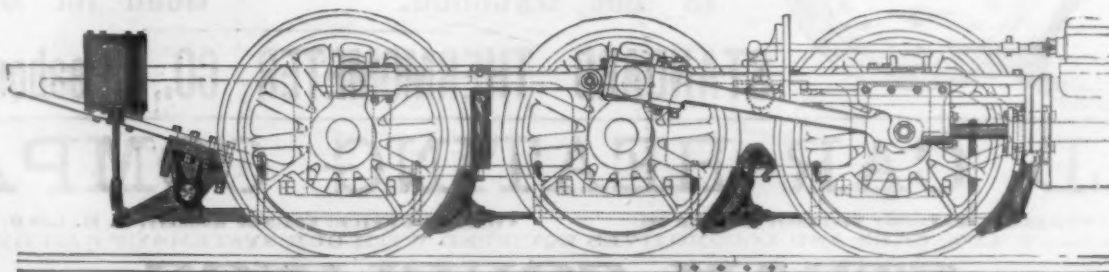
THE WESTINGHOUSE AIR BRAKE CO., Lessee,

CHICAGO OFFICE,  
GRAND PACIFIC HOTEL.

MANUFACTURERS OF

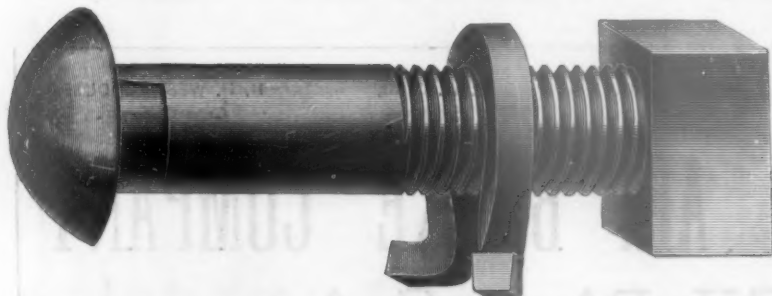
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Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers, furnished to operate with either STEAM, AIR or VACUUM.

# THE "STANDARD" NUT LOCK



Manufactured under D. O. Ward's Patents by the  
**STANDARD NUT LOCK CO.,**  
 NOS. 236-248 BANK ST., NEWARK, N. J.  
 SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spring steel, having horizontally inclined foot pieces, which are curved inward, thereby greatly increasing the spring resistance and acting simultaneously; rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down thread of bolt.

The nut lock for  $\frac{3}{4}$  bolt made of  $\frac{1}{4}$  in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, i. e., the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in inwardly curved extensions, which must apparently furnish additional short leverage spring force of a torsional character.

## Distinctive Merits of the "Standard" Nut Lock, Condensed:

Fixedness of position—cannot rotate and hammer down threads of bolt.

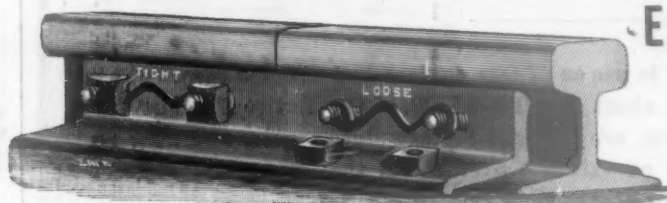
Cannot get one end into elongated slot of angle-bar.

Unlike any permanently placed, double washer, the Standard is interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks. Being fixed in position, it offers double the locking friction of nut locks, which when in their dead "set" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power, improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.



## Excelsior Automatic Nut-Lock and Fish Plate Spring

These Nut Locks have been adopted by the New England Road-Masters, in Conventions held at Hartford, Conn., Oct. 19 and 20, 1887, and Boston, Mass., Aug. 15 and 16, 1888, as the best Nut Locks known.

Sample lots furnished for trial, free of expense, by forwarding the distance between centres of fish-plate bolts. Correspondence and orders solicited.

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Patentees and Sole Mfrs. SCHUYLKILL FALLS, Philadelphia, Pa.



Simple.  
 Easily  
 Applied.  
 Very  
 Effective.

## THE NATIONAL LOCK WASHER

THE ONLY POSITIVE NUT LOCK IN COMBINATION WITH ELASTICITY.

Sixty Millions in Use in  
 Railroad Track.



For Use on All Kinds and  
 Classes of Work.

THE NATIONAL LOCK WASHER CO., Newark, N. J.

Made for all  
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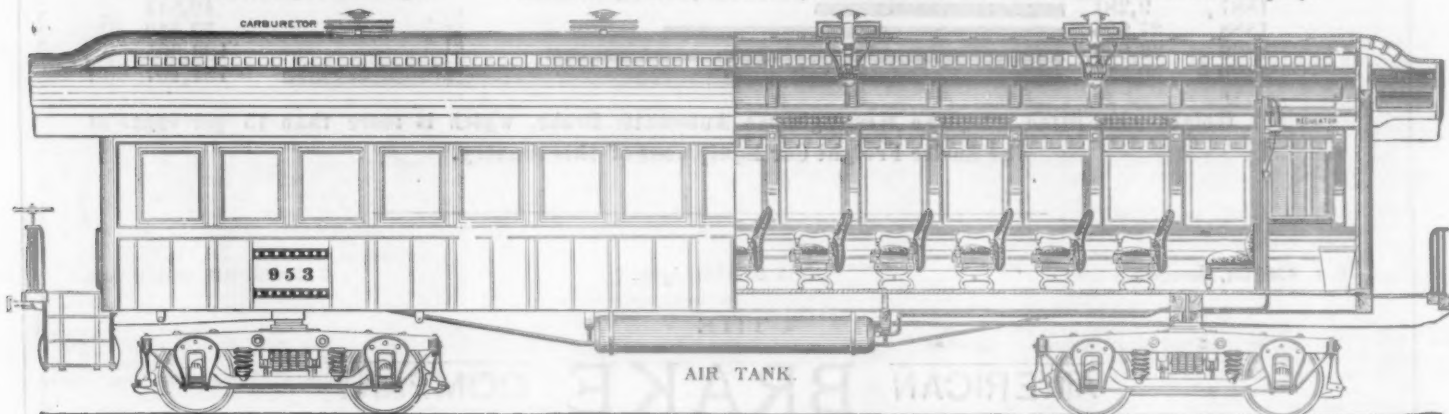
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Samples free of  
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The Greatest Light of the Age.

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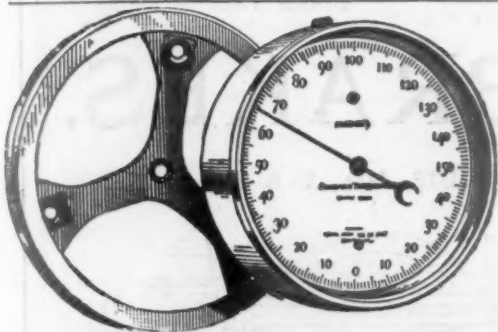


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ECONOMICAL AND RAPID CIRCULATION.  
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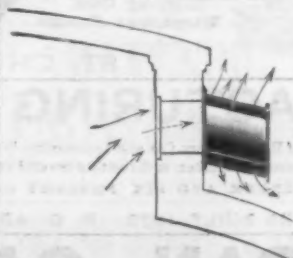
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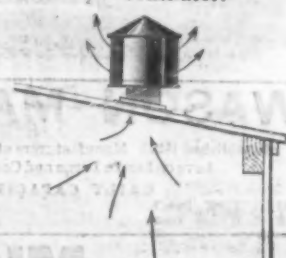
Strong exhausts from the impinge of the outside air,  
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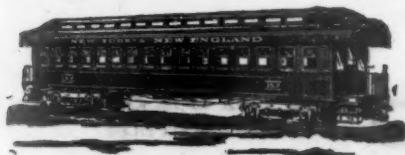
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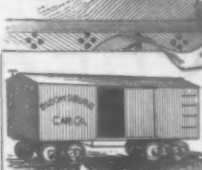
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Over 35,000 sold since it was placed on the market (January, 1887), as follows:

Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
N. Y. Central.... 181	Dul., S. Sh. & At. 20	N. Y. L. E. & W. 50	Illinois Central... 56	Louisv. & Nashv. 30	Royal Blue, L'd. 24		
Balt. & Ohio..... 118	Richm. & Danv. 20	Cent. R. R. of N. J. 58	N. Y. & New Eng. 72	Old Colony R. R. 46	Long Island R. R. 23		
Lehigh Valley.... 66	Phila. & Reading 185	E. Tenn., Va. & Ga. 31					

Various other roads, 295 cars. Total number of cars, 1,275, running on 65 different railroads.

NO CAR SEAT IN THE HISTORY OF RAILROADING CAN EQUAL ITS RECORD.

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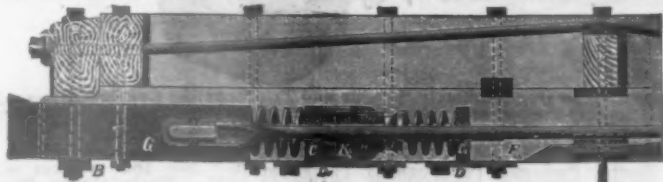


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ARIO PARDEE, Proprietor.

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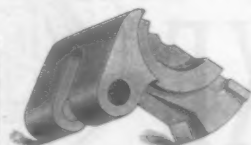
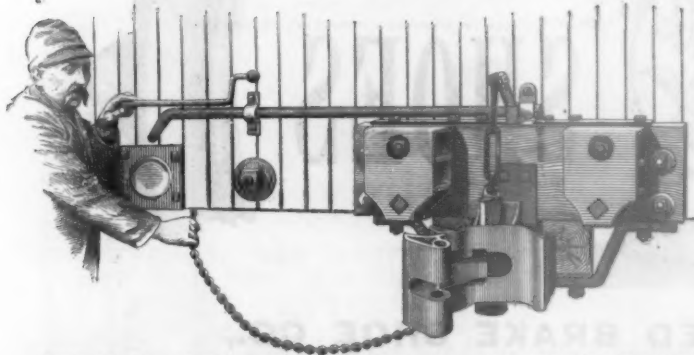
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(DOWLING TYPE).

THREE PARTS



Knuckle, Pressed Steel.



Pin, Drop Forged Steel.



Drawhead, Malleable Iron.

With Chain Attachment for Opening Knuckle WHEN REQUIRED.

**THE STANDARD CAR COUPLING CO., TROY, N. Y.**

MAIN OFFICE: 45 Broadway, New York.

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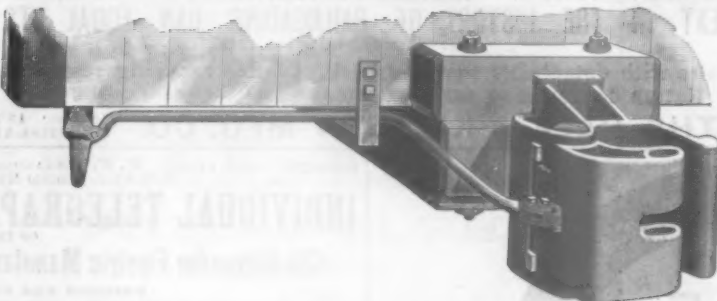
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## DREXEL

### COUPLER.

M. A. KILVERT, Treasurer.  
D. W. McCORD, Secretary.

Knuckle is Pulled Open from Side of Car by Continuation of Same Movement of Lever Which Raises the Lock.



Drawbar Cannot Fall on Track in Case of Breakage, as Connecting Rod Pulls Up Against Stirrup, Raises Lock and Allows Couplers to Separate.

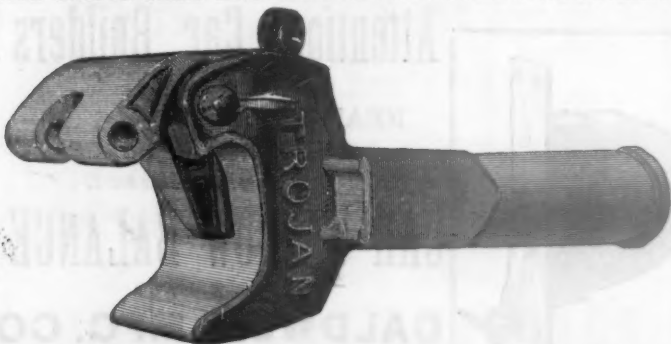
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M. C. B. TYPE.

THE STRONGEST AND THE ONLY SAFETY COUPLER.



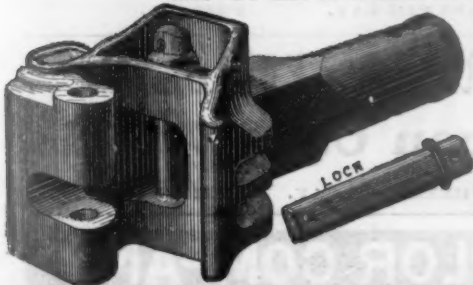
The knuckle may be thrown open for coupling by the hand-rod at the side of the car, rendering it unnecessary for trainmen to go between the cars to open the knuckle. The action is positive, and not dependent on springs or gravity.

The lock has a bearing of four square inches on the knuckle.  
N. O. Olsen, Engineer of Fairbanks & Co.'s testing department, says: "IT IS THE STRONGEST COUPLER NOW IN THE MARKET"

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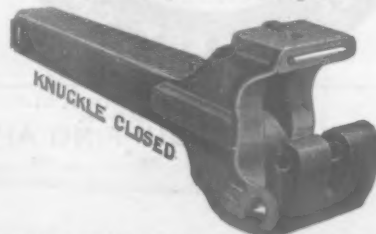
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Lightest, Strongest and Best. Automatic Self-Opening and Self-Adjusting. Insures Safety to Trainmen. Independent Double-Acting Gravity Lock. No Slack Required to Uncouple.



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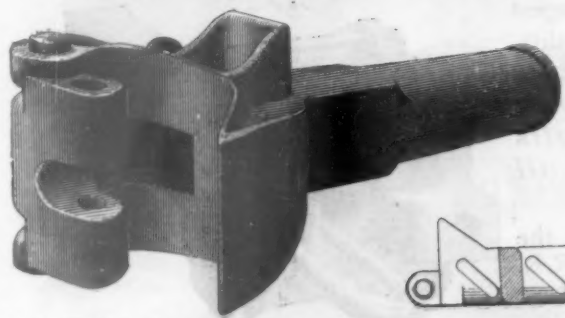
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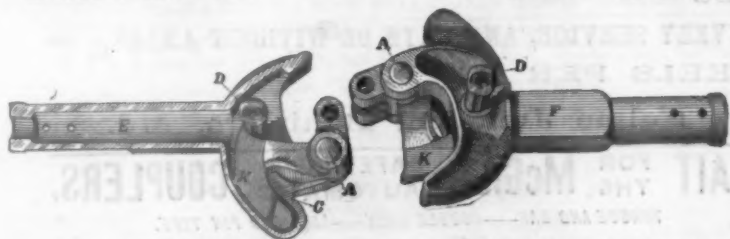


Solid Steel  
OR  
Malleable  
Iron,  
WITH  
Steel Knuckle.

Simplest,  
Strongest,  
Best.

F. L. WELLS, General Agent,  
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Direct drop of full sized pin makes a double lock formed by draw bar at "C" and Pin "D." Equally strong if pivot pin "A" is lost. Should pin be lost, use any link—no chains being required. The strongest Knuckle and Coupler known. Cannot be unlocked by any jolt of the cars. Couples with all M. C. B. types. The locking pin drops behind the step on rear of Knuckle "K" and keeps the knuckle always open when cars are separated. Removing the pivot pins, 33 loaded gondola cars were drawn from Paterson, N. J., to West End (18 miles), the pull being entirely on the DOUBLE LOCK.

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Gould Continuous  
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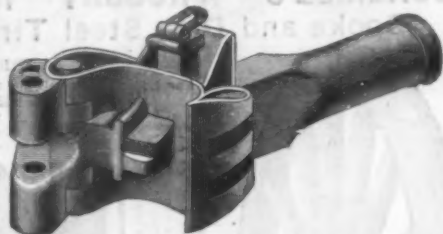
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M. C. B. Passenger Coupler.  
Used in Place of Miller Hook Without  
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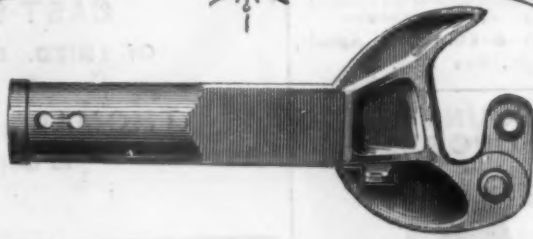


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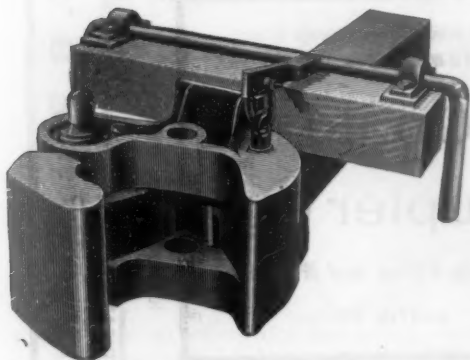
W. M. BARNUM, PRESIDENT.

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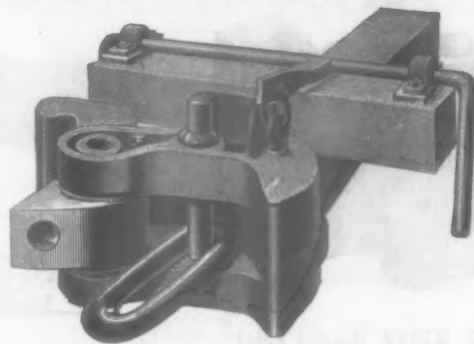
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Is the Cheapest, Safest and Strongest Coupler, on account of its durability. The *only* Automatic Coupler that has a lateral swinging hook and couples with the link and pin proper, *and pulls direct from the centre at all times.*

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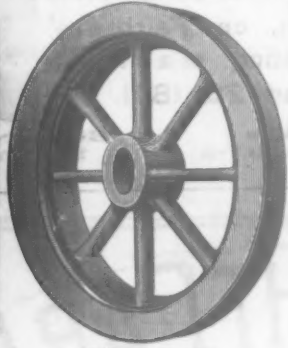
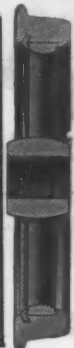
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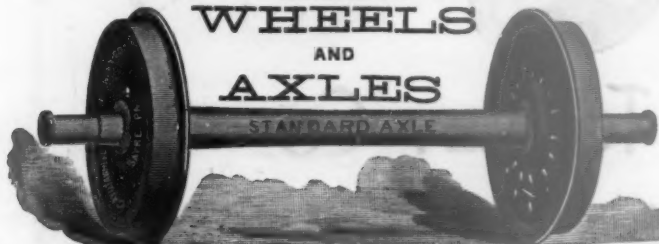
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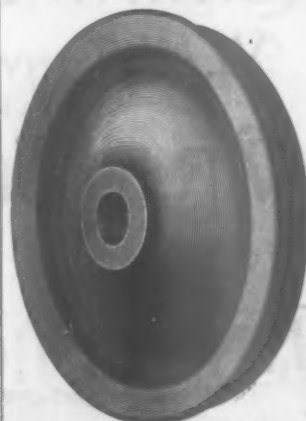
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SUCCESSORS TO "THE TAYLOR IRON WORKS."

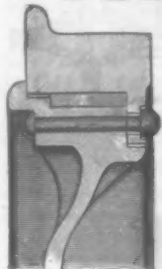
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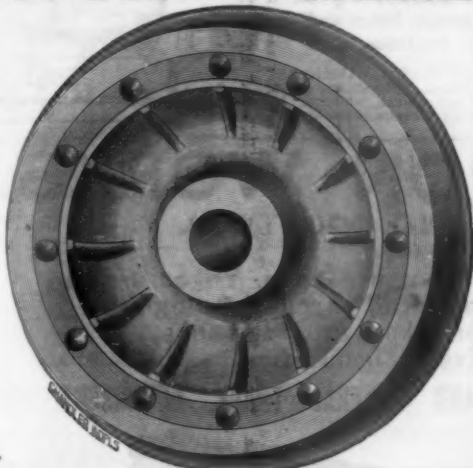
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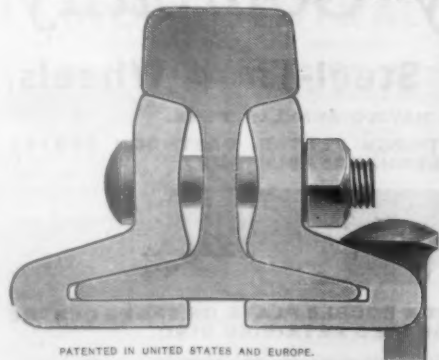
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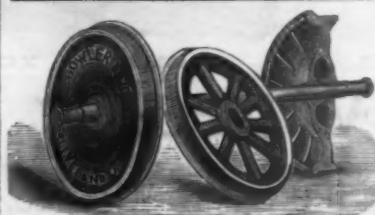
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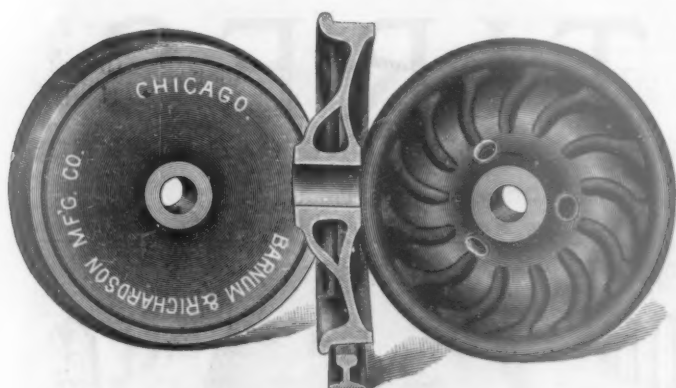
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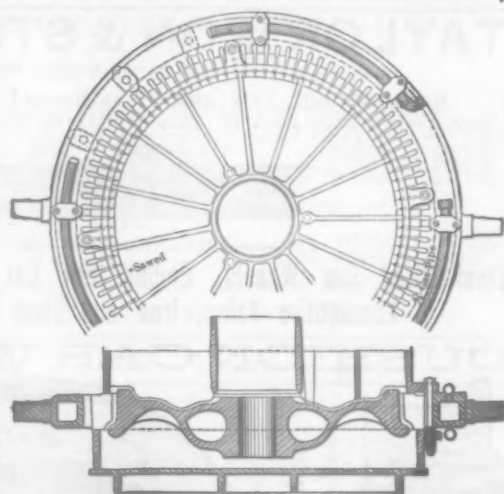
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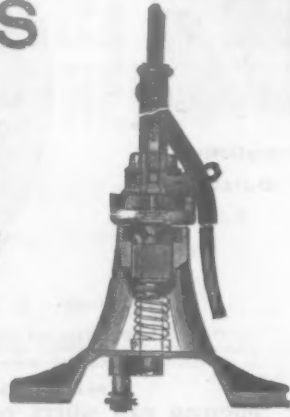
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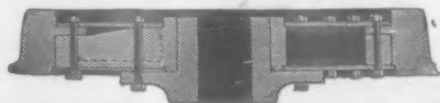
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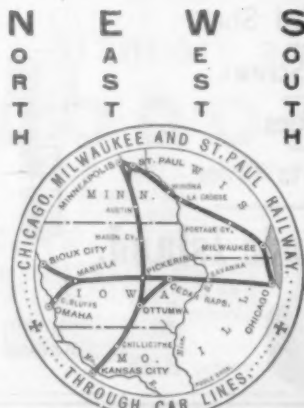
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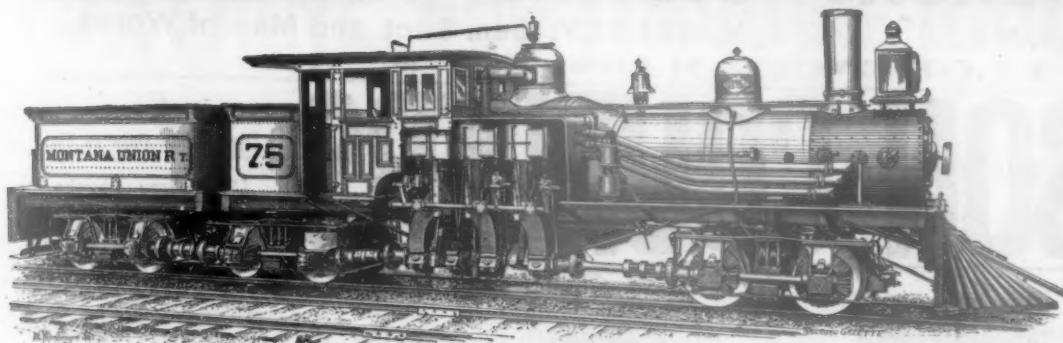
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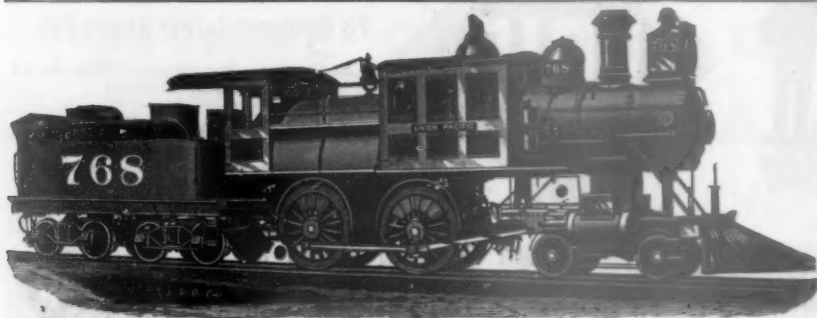
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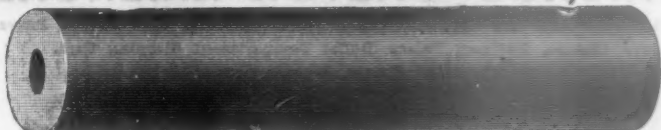
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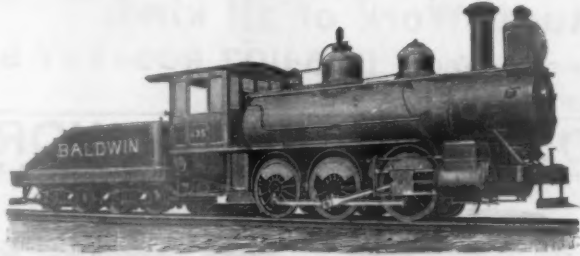
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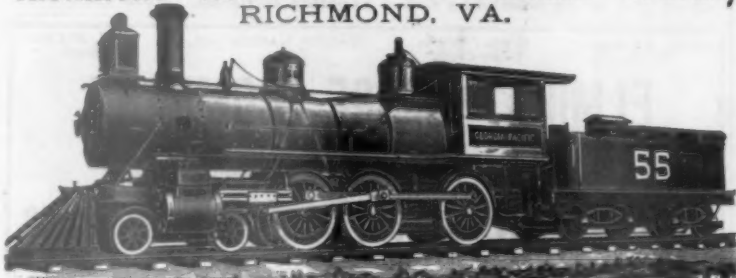
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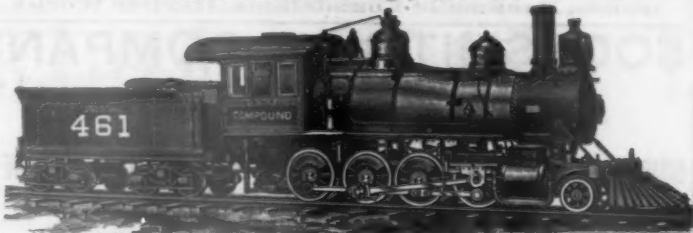
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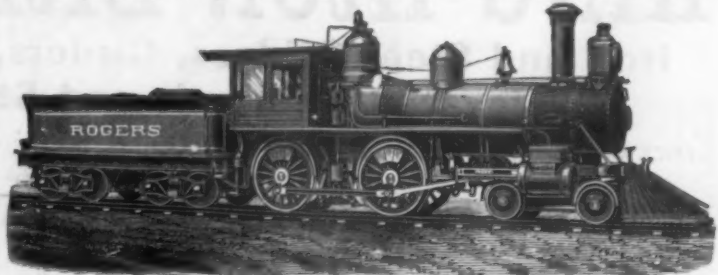
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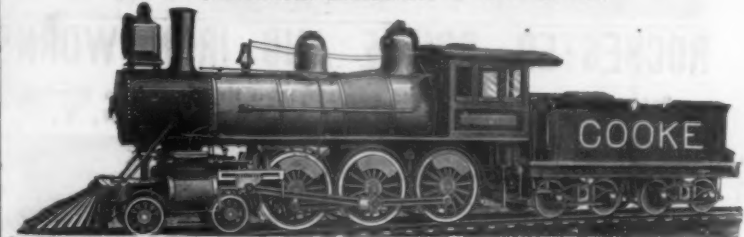
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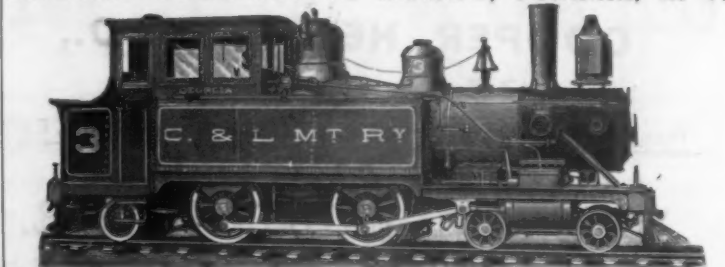
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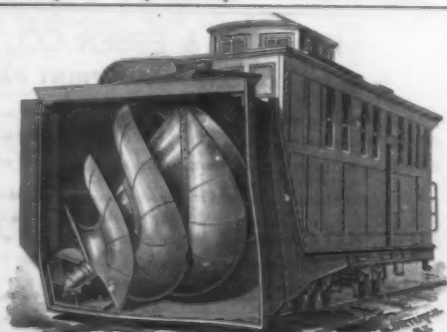


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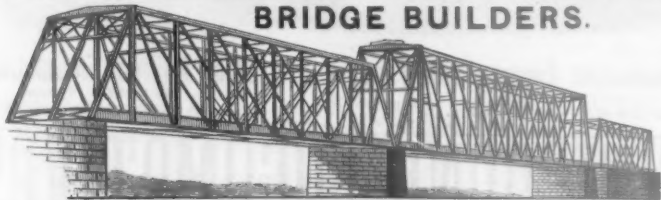
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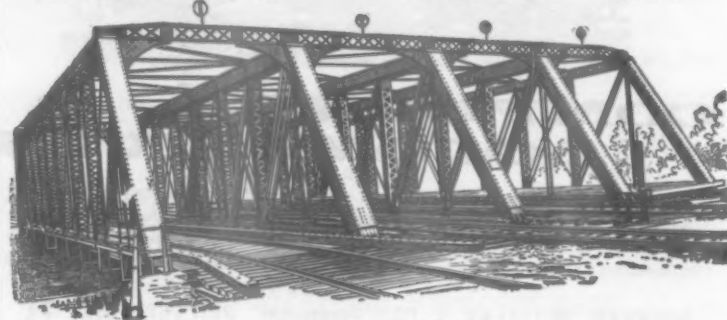
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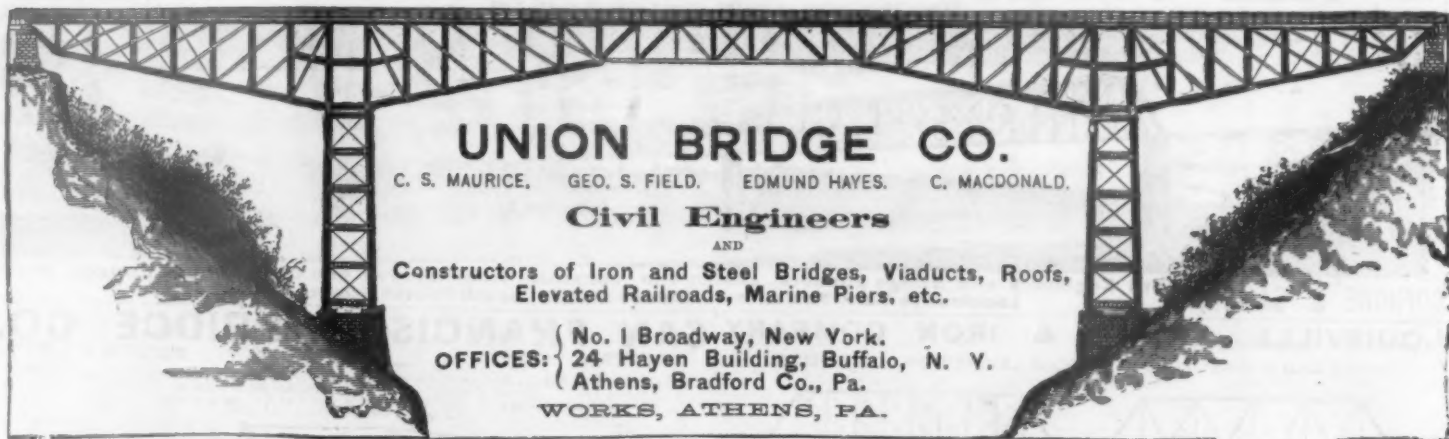
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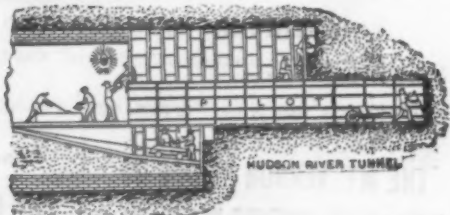
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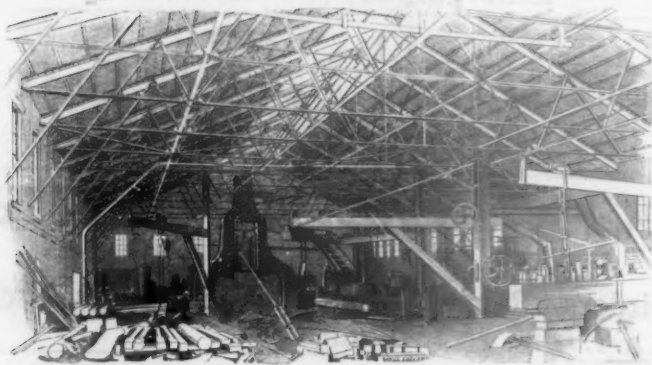
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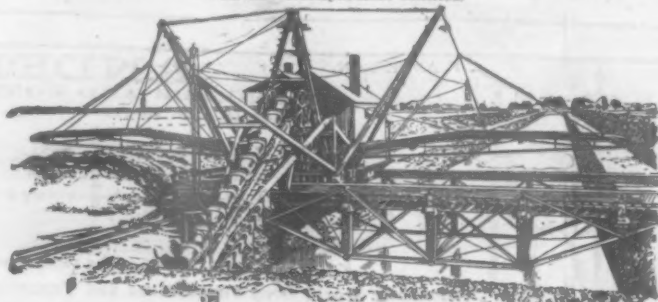
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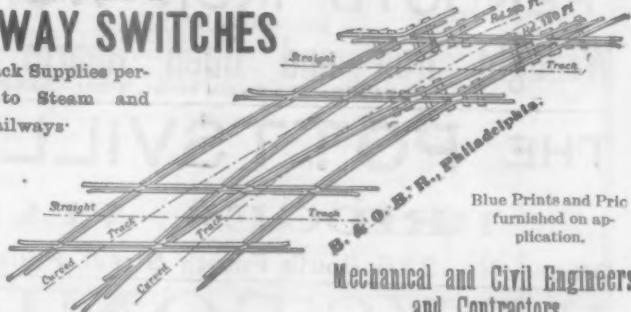
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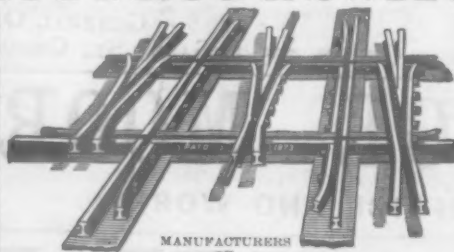
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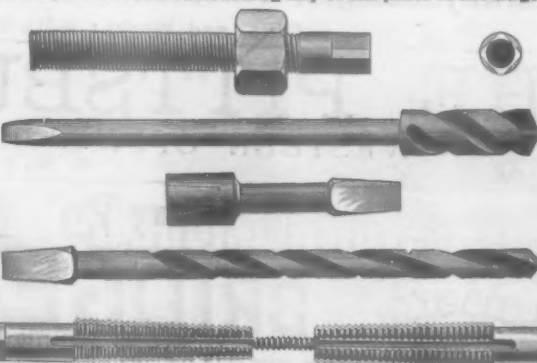


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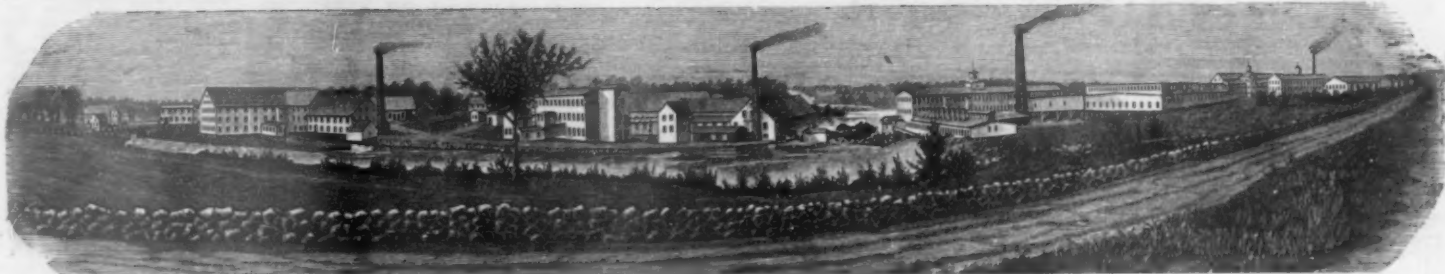




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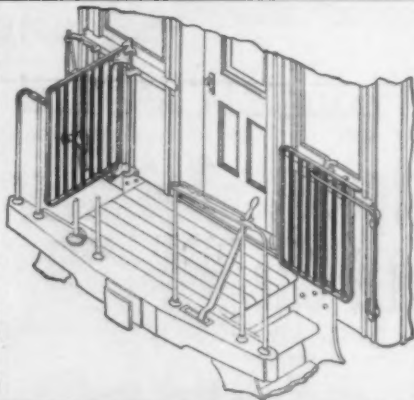
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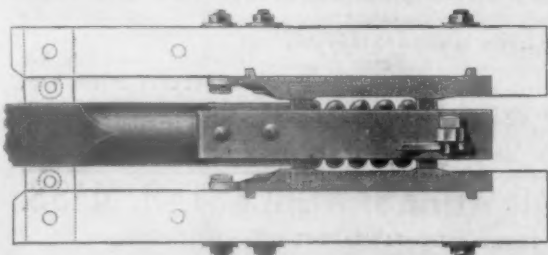
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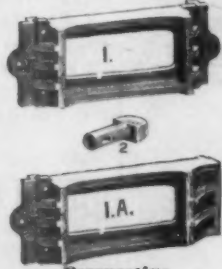
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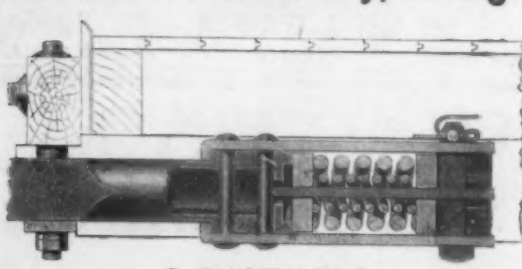
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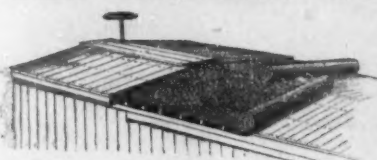


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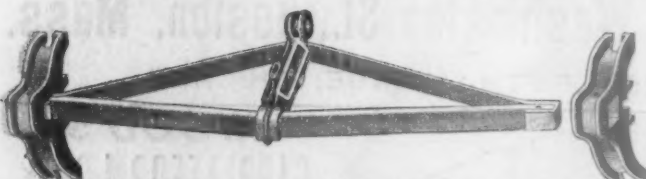
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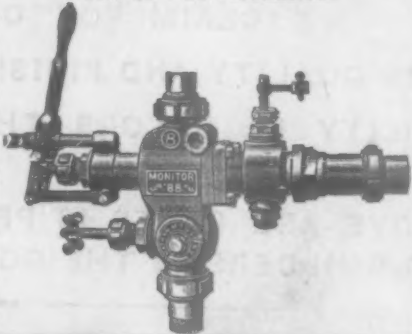
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